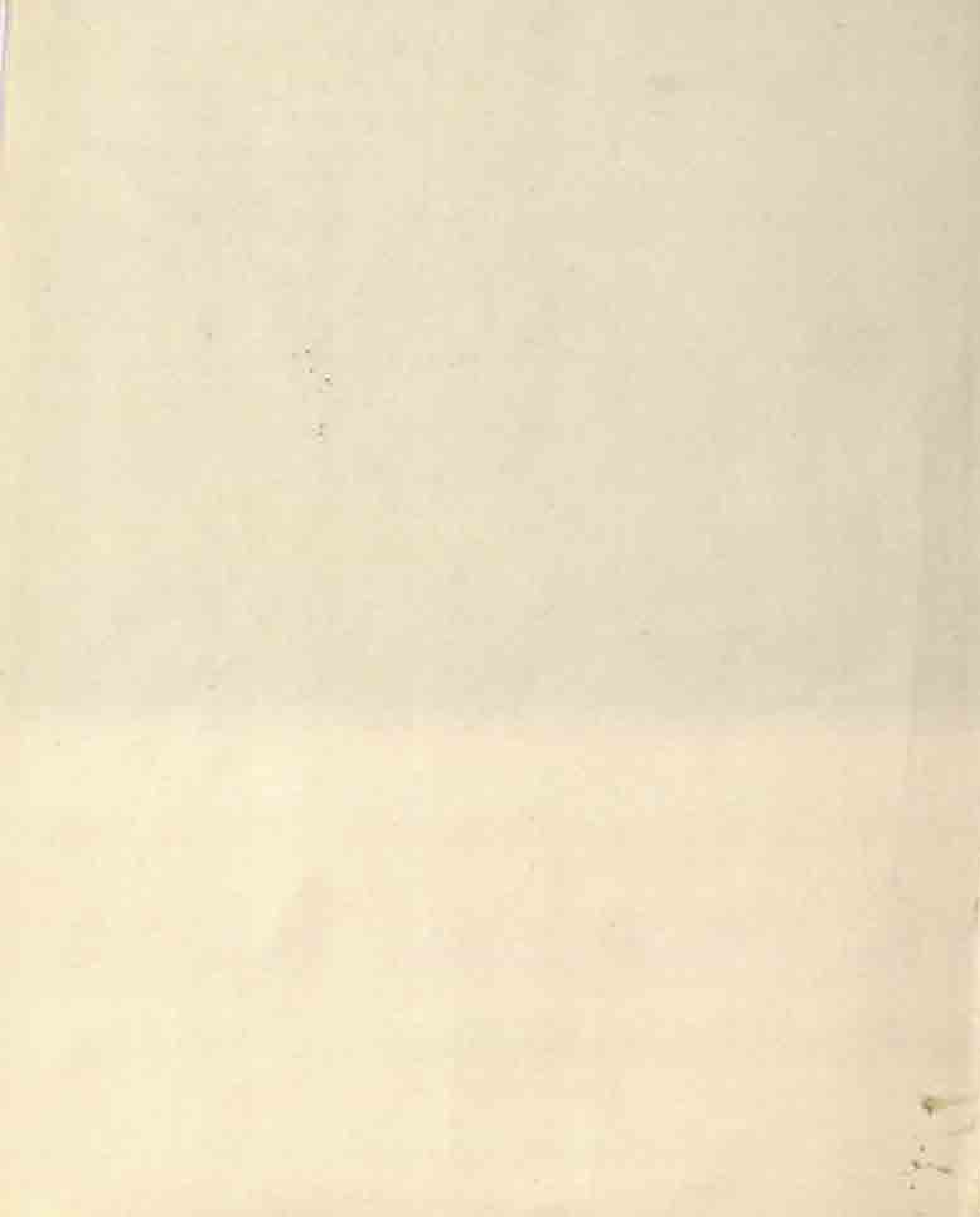


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NAGARJUNAKONDA

(1954-60)



VOLUME I

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Nagarjunakonda, the famous Buddhist site of Andhra Pradesh came into limelight in the early twenties of this century and has been attracting scholars and pilgrims ever since then. It has been the centre where the famous Amravati School of Art was fostered and encouraged subsequent to the fall of the Sâtavâhanas. Its threatened submergence under the multipurpose Project near Nagarjunasagar Dam, necessitated extensive and intensive salvage operations and this work took nearly six years (1954-60). The archaeological horizon of the site has been considerably widened and the antiquities discovered during these operations threw new light on the achievements of man right from prehistoric times to the fall of the Qutb Shahis of Golkonda.

The following pages, which form the first volume of the report on the excavations, embody the results of the investigations conducted in the valley for the prehistoric wealth including the megalithic remains. This work was done by a band of scholars, mostly from the Archaeological Survey, under my general guidance. Expert scientific reports were contributed by Dr. Totadri of Herbarium Madras and Shri S. B. Lal of the Chemical Branch, Archaeological Survey of India, besides the Anthropological and Geological Survey and Survey of India officials. To these scholars and institutions, I take this opportunity to express my grateful thanks.

I express my deep debt of gratitude to the Director General, Archaeological Survey of India for giving me the opportunity to work as Officer-in-Charge of the excavations and later appointing me as Superintending Archaeologist (Special) for editing this report. In the preparation of this report, I have been assisted by Dr. K. Krishnamurthy and Shri B. Vidhyadhara Rao, who worked unsparingly in making the manuscript complete in all respects. I express my special thanks to them. My thanks are due to Shri B. Vidyadhara Rao, also for preparing the inden of this volume.

My thanks are due to Shri N. S. Krishnamurthy, Advocate, Nellore, who took pains in obtaining a photograph of Late Ranga Swamy Sarasvati, the discoverer of Nagarjunakonda.

In the preparation of illustrations, maximum help was rendered by Sarvashri Laxmi Dutt, M. S. Mani and Basheer Khan of the Drawing Section, Sarvashri R. Chatterji, G. L. Narayana of the Photo Section of the Headquarters Office and Shri K. S. Mani, the then Photographer of Nagarjunakonda Excavation Project for the frontispiece and to Sarvashri K. Ramaswamy, P. V. Subba Rao, M. N. Prasad Rao, P. Kameshara Rao, Ranjit Roy, Johnstone, K. V. Raman Rao, P. R. K. Prasad and Nambi Raju, for the preparation of the tool drawings and survey plan of the valley; Shri V. Sitaramaiah, Stenographer of South-eastern Circle, Hyderabad and Shri R. C. Sahotra, Stenographer, attached to this Unit for their neat typing of the manuscript, to all these I am greatly indebted. Lastly, I shall be failing in my duty if I do not thank Shri J. C. Gupta, Production Officer of the Directorate for expediting the publication.

R. Subrahmanyam

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INTRODUCTION

NĀGĀRJUNAKOṆḌĀ OR THE HILL OF NAGARJUNA ON THE SOUTHERN BANK OF THE RIVER Krishna is located in a valley (pl. I) that was known till recently to archaeologists by the same name, in the Palnad Taluk of Guntur District of Andhra Pradesh. This site is now completely submerged under an irrigation-reservoir formed as a result of a dam built across the river Krishna about 10 km. down the stream. The flattish top of this hill which rises about 14 metres above the full reservoir-level is at present the only landmark of that famous and extensive archaeological site discovered as early as 1926 and subjected to spade for over 40 years. This hill is lozenge-shaped (pl. IIA) with a plateau of sheet rock on top, the edges of which form rugged cliffs all around converting it into a natural fortress. The kings of the Ikshvāku period as well as their successors, who used this hill as a citadel, fortified it by constructing a long brick wall with bastions and gateways in the early period and later by a cyclopean masonry wall of granite with curtain walls, partitioning the top into three enclosures.

It is on the top of this hill that much of the excavated antiquities of the sites in the valley and on the hill-slopes are now preserved in a museum (pl. IIB). Adjoining this museum and in the open space, structures of supreme importance from the valley have been bodily transplanted and re-built for display. Those that could not be lifted but which form an important link for an understanding of the cultural sequence of this site, have also been preserved by the preparation of full-scale models which are also exhibited in the first and second enclosures on the hill-top. There is another group of reconstructed monuments at 18th km. where the road from Macherla descends into the valley. A few of the reserve-collections have been preserved in the buildings constructed here.

The Museum has on exhibition in its different galleries, choice specimens of the antiquities, small and large, of various periods, both prehistoric and historic. They include, among the small antiquities, beads from the neolithic period onwards, gold and silver ornaments of the megalithic and Ikshvāku periods, coins of the Roman empire, later Sātavāhana kings, Ikshvāku rulers and late Muslim and Vijayanagar rulers, relic caskets from the *stūpas* with their contents of gold and silver, an entire goldsmith's outfit of tools and implements and a bronze figure. The larger specimens are the sculptures, bas-reliefs and panels in the round, both Buddhist and Brahmanical, architectural components like pillars, *āyaka* pillars, *chandraśilā* (moon-stone step), *āyaka-paṭas*, casing slabs (*śailamaya kañchuka*), inscribed pillars and slabs, objects of daily domestic use such as pestles, querns, dabbers, weights, moulds, etc., all of the Ikshvāku times; and pottery of the neolithic, megalithic and the Ikshvāku and later periods. One of the halls in the Museum houses a full-scale model of the valley and small-scale models of the excavated monuments such as the neolithic and the megalithic burials, the *Mahā-stūpa,* the Amphitheatre, the Bahuśrutīya-*vihāra*, Mahīśāsaka-*vihāra*, Sarvadeva temple, Pushpabhadrasvāmī temple, Ashṭabhujasvāmi temple, bathing-*ghāṭ*, etc.

On the grounds, outside the Museum building, on the Nāgārjunakoṇḍa hill, the monuments transplanted and reconstructed, are the bathing *ghāṭ* (Site 34),[1] megalith (Site 44), monastery (Site 4), apsidal shrine (Site 43), *Mahā-chaitya* and apsidal shrine (Site 7) and *stūpa* with *svastika* inset (Site 59). The monuments that have survived, and as such conserved or reconstructed *in situ* on the east bank of the reservoir, are the Amphitheatre and the so called Hāriti temple (Site 17), monasteries (Sites 3 and 32A), and temple (Site 56). The replicas of the monuments in the first group of open-air exhibits are: section of rampart—'Cutting A', *stūpa* with four-spoked base (Site 14), monastery (site 106), monastery (Site 4), temple (Site 64), Kārttikeya temple (Site 82) and temple-complex (Site 78). The replicas in the second group are the Sarvadeva temple (Site 99), Pushpabhadrasvāmin temple (Site 34), Burning Ghat (Site 126) the ablution tank and fire-places for *Aśvamedha* (Site 93), Arena (Site 122) and a section across the palaeolithic site (Site 128).

The valley itself, about 4 km. east-west, and slightly less in the north-south, is bounded on its three sides, north, east and south, continuously by hills, formed by the spurs of the Nallamalai range of the adjoining Kurnool District, while on the fourth or the western side flowed the mighty Krishna forming its boundary on that side. The erstwhile village of Pullareddigudem, and its hamlets nestled in the valley, the red soil of which supported partially cultivated areas, the rest being scrub or dry forest ascending up the hills. The Nāgārjunakoṇḍā hill lay to the north-west of this valley close to and overlooking the river. Across the river, the other side of the valley in the Nalgonda District, which is likewise surrounded by low hills on its three sides, with the river to the east on its fourth side; the river thus, more or less, segments a larger valley that has now become the hill-locked reservoir after the construction of the Nagarjunasagar Dam. Earlier, the river could be crossed at fordable points, near Yelleswaram ferry and at a place near the bathing ghat, etc. The nearest rail-head is at Macherla on the Guntur-Macherla branch-line, and some 20 km. from the site on the east, the distance from Guntur, the District headquarters, being 160 km. It can also be approached by road from Hyderabad, the capital of the State, located some 166 km. to its north-west. The approach roads from Guntur and Hyderabad terminate on the right bank of the Nagarjunasagar Dam from where there is a connecting launch-service across the reservoir, to the Nāgārjunakoṇḍa hill and the Museum.

The discovery of Nāgārjunakoṇḍā is as romantic as the nature of the objects discovered, climaxed by its sad and unexpected submergence. Longhurst[2] reports that the site was first brought to light by the late Rangaswamy Saraswati (pl. III), Telugu Assistant to the Government Epigraphist for India in 1926. Earlier, the site appears to have been explored by interested local scholars, particularly by a school teacher—Sri Suraparaju Venkataramiah, a native of Macherla and working at Nagulavaram, a hamlet about 9·5 km. from Nāgārjunakoṇḍā. On the information supplied to him by some cowherds about the existence of stone pillars and mounds of brick overgrown by jungle at Nāgārjunakoṇḍā, this school teacher visited the mound on the 21st February, 1920, and with great difficulty

[1] *Vide* list of Sites, Appendix-A.

[2] A.H. Longhurst, *The Buddhist Antiquities of Nagarjunakonda, Madras Presidency*, Memoirs of the Archaeological Survey of India, No. 54 (Calcutta, 1938), p. 1.

approached the pillar on the mound containing the inscription, took a rubbing of it and, failing to understand the contents of the record, reported the matter to his Deputy Inspector of Schools, stationed at Gurajala. The latter, Sri Lingammallu Dharmapuri, who was also an enthusiast, reported the matter to the Government besides giving publicity to the find of the new inscription and the mound discovered at Nāgārjunakoṇḍā in the local newspapers. This information and the publicity given by the local school teacher and the Deputy Inspector of Schools might have attracted the attention of Sri Rangaswami Saraswati, who incidentally visited Nāgārjunakoṇḍa, copied the inscriptions and submitted his report. The latter is said to have found several brick mounds and standing marble pillars, some of them bearing inscriptions in Prākṛit characters of the second and the third centuries A.D. Hamid Quraishi, officiating in the place of Longhurst, was deputed in the same year to visit Nāgārjunakoṇḍā to ascertain the extent of the site and its potentialities. To quote Longhurst's own words, "although his visit lasted only a week or two, he found no less than eighteen inscribed pillars, two ruined apsidal temples and several sculptures, showing that the site was rich in Buddhist antiquities and well worth the cost of excavation."[1] During the same year, Dr. Hirananda Sastri, the then Government Epigraphist for India visited the site and had estampages prepared of all the inscriptions discovered. These were forwarded to Professor Vögel of the Leiden University who, at Dr. Hirananda Sastri's request, undertook the laborious task of editing the inscriptions.[2]

On his return from leave, in 1927, Longhurst started systematic explorations of the Nāgārjunakoṇḍā valley and completed his work in February 1931. The discoveries of Longhurst include a number of ruined monasteries, apsidal temples, *stūpas*, inscriptions, coins, relics, pottery, statues and over four hundred magnificient bas-reliefs in the Amaravati style and belonging to the same period, besides pavilions or *maṇḍapas*, *vihāras*, a palace site and a stone-built wharf[3] on the banks of the river Krishna.

Information supplied by the inscriptions[4] discovered by Longhurst, though meagre, indicated that they belonged to a dynasty called the Ikshvākus, little known by then except from a fragmentary inscription from Jaggayyapeta.[5] It is interesting to note that this dynasty of the Ikshvākus who claim their descent from their mythical progenitor of the Solar race could find a happy and congenial soil for settlement in the south. The Ikshvākus had apparently entered into the service of the Sātavāhanas, the imperial

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[1] Longhurst, *op. cit.*, p. 1.

[2] *Epigraphia Indica*, vol. XX (1929-30), pp.1-37 and vol. XXI (1931-32), pp. 61-71.

[3] The so-called 'palace site' was nothing but a *maṇḍapa* situated outside the rampart wall; recent excavations have also revealed that the stone-built wharf was in fact the Sarvadeva temple. All the structures excavated by Longhurst were also re-excavated as part of the scheme of the recent work. The numbering of sites in the recent scheme of work 1-9 follows that of Longhurst and is identical with his numbering of sites.

[4] *Epigraphia Indica* vol. XX (1929-30), pp. 1-37 and vol. XXI (1930-31), pp. 61-71. Further epigraphical material has been published in *Epigraphia Indica*, vol. XXXIII (1960), XXXIV (1960-63), XXV (1963-64) and XXXVI (1964-65).

[5] Jas. Burgess, *The Buddhist Stupas of Amravati and Jaggayyapata in the Krishna District, Madras Presidency*, Archaeological Survey of Southern India, I (London, 1887) p. 110 f.

overlords of the Deccan (*circa* third century B.C.-third century A.D.) and, on the decline of the imperial dynasty, established themselves in the Śrīparvata or the Nallamalais region in the south, carving out a small principality of their own with Vijayapurī in the valley of the Nāgārjunakoṇḍā as their capital. They had, as could be gathered from the inscriptions, matrimonial alliances with the contemporary rulers of western and central India, particularly the rulers of Vanavāsī (North Karnataka) and the Kshatrapas of Ujjain.

The site was again excavated by T. N. Ramachandran during 1938-40[1] who exposed a *stūpa* and a *vihāra* with some sculptures. The structures excavated by the previous workers have been re-excavated as part of the recent project in order to prepare accurate plans and sections and to facilitate correlation of the material with the current finds.

As a sequel to the proposed construction of dam across the river Krishna at Nandikoṇḍa, this picturesque and historic site with all its archaeological treasures, was threatened with deep submergence and it was decided by the Government of India that before the site is submerged the entire valley of Nāgārjunakoṇḍā should be thoroughly explored and excavated and archaeological material retrieved as far as possible. For the implementation of this scheme, a special office with Dr. R. Subrahamanyam, Assistant Superintendent as the in-charge officer was opened at Guntur in August, 1954 and intensive excavations were taken up which continued till March 1960. He was assisted by a Technical Assistant and a Draftsman Surveyor besides ministerial staff in the beginning. In the first year of excavation (1954-55), nearly ten sites were excavated and the discoveries were sufficiently spectacular proving the vast and yet the undisclosed potentialities of the site.

The office of the Excavation Project was upgraded in November 1955 and a team consisting of a Superintendent, ten Assistant Superintendents, seventeen Technical Assistants, two Surveyors, three Photographers and a number of Draftsmen, Foremen, Modellers and a Chemical Assistant was formed. T. N. Ramachandran, after his retirement as Joint Director General of Archaeology, joined the team as Special Officer. Dr. R. Subrahamanyam continued throughout as the Superintendent, in over-all charge of the work. On his transfer as Superintendent, Northern Circle, Agra, H. Sarkar took over charge of the Project at the stages of its closure and wound up the work and organized the documentation for publication purposes. But for the active co-operation and unstinting work of the team, the Survey could not have completed a salvage excavation work of this magnitude by the scheduled target date.[2] Dr. B. B. Lal, Archaeological Chemist in India helped in examining the soils, bone remains, metal objects, etc. The grateful acknowledgements of the Survey are due to the Director, Meteorological Department, Madras, who opened at our request a meteorological observatory to study the meteorological conditions of the site; to Dr. N. K. Bose, Director, Anthropological Survey, who had deputed his

[1] T.N. Ramachandran, *Nagarjunakonda 1938*, Memoirs of the Archaeological Survey of India, No. 71 (Delhi, 1953).

[2] The scientific excavation, though done as a major salvage, involved retrieval of the buried antiquities and monuments, and the anastylosis or other methods of their reproduction may be said to be the first of the kind, anticipating the work in the Nile valley, Aswan Dam.

assistants for lifting the skeletal remains and reporting on them; and to the Director, Zoological Survey, who deputed Shri Bholanath to examine the skeletal remains of the animals, for the help rendered and contributions made. The reporting of the work was entrusted to K. R. Srinivasan for a year (1968-69). The work was once again entrusted to me in September, 1969.

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7. ,, M. D. Khare
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Chemical Assistant :

Shri P. Srirama Murty

In order to co-ordinate the activities of the Nagarjunasagar Project and Nagarjunakonda Excavation Project, the Government of India constituted a Co-ordination Committee[1] consisting of the following:

1. Governor of Andhra Pradesh	Chairman
2. Chief Minister, Andhra Pradesh	Member
3. The Joint Secretary, Ministry of Education, Govt. of India	Member
4. The Administrator, Nagarjunasagar Project	Member
5. Superintendent, Nagarjunakonda Excavation Project, Guntur	Secretary

This committee was later expanded by nominating two Members of Parliament as Members. Early in 1956 with a view to review the work periodically and to find ways and means of co-ordination and co-operation between the State and Central Departments, a sub-committee consisting of the Administrator, Nagarjunasagar Control Board, the Chief Engineer, Nagarjunasagar Project, the Financial Advisor and the Chief Accounts Officer, Nagarjunasagar Project and the Superintendent, Archaeological Survey of India in-charge of the excavations was formed under the purview of the co-ordination committee. This sub-committee met almost every month, reviewed the progress of the excavations and straightened up matters relating to the needs of the excavations that necessitated action by the State Government.

In accordance with the valuable suggestions of the Prime Minister of India (late Shri Jawaharlal Nehru, who visited while the work was in progress at an early stage) regarding the need to carry out explorations and excavations and to salvage all Archaeological monuments and transplant the same at a selected spot on one of the unsubmergeable hills which formed part of the excavated ruins of the city of Vijayapuri, the Government of India initiated further procedure in that direction. An Expert Committee consisting of the Secretary to the Government of India, Ministry of Education as the Chairman, the Chief Architect, Central Public Works Department, New Delhi, the Additional Chief Engineer (Irrigation), Andhra State, Vijayawada, the Dean, J. J. School of Arts, Bombay, Shri Vijayatunga and a Member of Parliament as members was constituted with the Director General of Archaeology in India as the Member-Secretary to advise on the measures to be taken for shifting to a safe place above full reservoir level and for preparing models or plans, etc. of the various archaeological structures that were already exposed as also those that were to be unearthed during the course of the excavations.

The entire valley was systematically surveyed and divided into sectors (fig. 1). These have been grouped under the series 'N' and 'S' the northern and southern of an imaginary base line running east to west from the Peddakundeḷḷaguṭṭa to Phirangimotu hill dividing the valley into two halves. Each sector was further sub-divided into divisions of 100 ft. squares

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[1] Letter No. F 3-126/66-C.1 dated 26.3.1957 from the Government of India, Ministry of Education to the Director General of Archaeology in India, New Delhi.

or 30·5 metre square, in which 20 feet or 6·1. metre square trenches were laid. Systematic combing of the entire valley was done, the work extending over five years. Numerous structural remains belonging to the period of the Ikshvākus and to the subsequent periods, along with huge quantities of pottery, coins, inscriptions, terracotta figurines etc. were unearthed. The structures include in addition to Buddhist *stūpas* and *vihāras*, temples of Śiva, Kārttikeya, Devasana, Kubera, Hāriti and other gods, besides secular buildings like an auditorium, palace site and a number of ritualistic structures.

The prehistoric potentialities of the area were recognized for the first time during the recent and last salvage explorations and excavations preceding the submergence of the entire valley in the reservoir. The Stone Age culture of the valley was earlier studied by Shri K. V. Soundarajan.[1] Some joint exploration and excavation were also conducted by the Project Officers in collaboration with the Prehistory Branch of the Survey. As regards the megalithic monuments, a few of them lying in the vicinity of the Great *Stūpa* had already been noticed before by Mr. Longhurst but their further systematic excavation was mostly carried out during the recent excavations.

Publication of this report on the excavations was considerably delayed due to a number of causes. The editing of the manuscript was entrusted to Shri K. R. Srinivasan in the year 1968, and later in 1969, I was asked to take up this assignment. For this favour I express my gratitude to Shri B. B. Lal, Director General of Archaeology, since it gave me the opportunity to finalize the work commenced by me. In December 1971, Dr. K. Krishna Murthy, Deputy Superintending Archaeologist was posted to work conjointly with me, with a view to accelarate the finalisation of the Nāgārjunakoṇḍa report.

The following chapters from the first volume of the Memoir. They deal with stone age and megalithic cultures unearthed during the recent excavations work at Nāgārjunakoṇḍa while the second volume of the present Memoir would deal with the structures and other antiquities of the historic periods discovered in the course of the recent excavation.

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[1] K.V. Soundara Rajan, 'Studies in the Stone Age of Nagarjunakonda and its Neighbourhood', *Ancient India*, no. 14 (1958), pp. 49-113.



I. PHYSIOGRAPHY, CLIMATE AND FLORA

NAGARJUNAKONDA (NAGARJUNADURGAM) LOCATED IN LAT. 16° 31'N., LONG. 79° 14'E., is a picturesque valley in the Palnad taluk of the Guntur District, Andhra Pradesh, with the village of Pullareddigudem (Pullareddipalli, lat. 15° 15'N. long. 79·00 E.) about three kilometres to its south inside the valley. The valley is really the eastern part of a longer hill-girt valley, formed by its bisection by the northwardly flowing Krishna river. The river, after skirting round the Nagarjunakonda hill at the north-west point of the valley, further turns east, thus narrowing the width of it by abruptly coming close to the hills that form the northern, eastern and southern boundaries of the place. The hills are the spurs of the Nallamalai range of the adjoining Kurnool District. The ground slopes down from the foot of the hills towards the river, the lowest point being 76 m. above Mean Sea Level; the highest points on the hills to the east, the Phiranghimotu, being over 245 m. above M.S.L., on the south, the Eddanamotu, 185 m. above M.S.L., as also on the north. The Nagarjunakonda hill itself, from which the valley had taken its recent name (before submergence), is over 310 m. above M.S.L. (Fig. 1). The hills are wooded, and the river was formerly almost dry during most part of the year with a rocky bed covered by pebbles and sand dunes, but swelling enormously over its entire half-mile, or three quarter kilometre width with a mighty flow. It is deepest at the point where it emerges out of the hills near Yeleswaram, where it is fordable by country craft or coracles, the ferry point Putlagudem deriving its name on the account. The valley proper is undulating with areas reaching the 130 m. contour level in its midst near the high ground of Pullareddigudem, dipping down to the 76 m. level near the river and varying in other places between these two marks and rising up steeply again on the inner slopes of the hill. On the eastern side was a perpetual nullah starting from Lambadigudem along the base of the Phirangimotu eminence and discharging into the Krishna near the north-east corner of the Nagarjuna hill.

The valley lies in a region of low rainfall that locally ranges from 381 to 508 mm. per annum. Next to Rentachintala in the same District it was one of the hottest places in the Andhra Pradesh and South Deccan with a temperature reaching up to 48.89°C at times. The temperature normally touches 43.83°C to 47.78°C during summer (May and June) in the annual temperature range of 21.11°C to 48.89°C.

While the predominant soil of the valley is of the red-gravelly variety, there are patches of black soil particularly restricted to the limestone belts that was suited for cultivation. It is black and argillaceous and sightly calcareous, contracting and powdery in dry weather and swelling and adhesive in wet weather, and capable of retaining considerable moisture, perhaps because of its humuss content. Cotton, millets and a few other crops and trees are grown over these areas. The origin of this black soil, according to Bruce Foot, was due to the existence in former times of large and thicker forests when a most moist climate than in recent times prevailed.

The valley and the hills supported a considerable flora. The floristic studies of the valley were conducted by the Botanical Survey of India and its Central National Herbarium in two major seasonal explorations and the results compiled by K. Totadri of the Herbarium are extracted below:

The vegetation can broadly be classified into: (A) vegetation of the plains, composed largely of herbs together with a few shrubs and rarely trees; (B) scrub-jungle at the foot of hills; (C) thorn forests on the hill-slopes; and (D) dry deciduous forests on the hill-top.

A. VEGETATION OF THE PLAINS:

The vegetation of the valley consisted for the major part of herbaceous plants together with a few shrubs, leaving little tree-growth. Originally the valley too must have been a typical scrub-jungle which had become denuded of its character due to human agency. This was further evidenced by the presence of scrub-jungle all round the foot of the hills and to some extent interior on the plains. A number of palmyra trees (*Borassus flabellifer*, Linn.) were supposed to have been growing in the valley, leaving at the time of the survey a few scattered here and there.

A majority of the herbaceous plants in the valley were annuals and there was a distinct, seasonal succession of vegetation in the valley. Plants of the monsoon period were noted for their associations. Important associations of this type were *Cleom-Heliotropium*, *Tephrosia-Helietropium* and *Cleome-Tribulus-Tephrosia*. The most dominant plant was *Cleome viscosa*, found everywhere in the valley. It grew in association with *Heliotropium zeylanicum* and *Tephrosia purpurea*, the former occurring in large populations and noted for its profuse blooming. (*T. purpurea* found rapidly spreading in the valley, was evidently introduced since its use as a green manure plant and had perhaps spread widly into the valley.) *Tribulus terrestris*, a prostrate herb with yellow flowers was very common with other herbs like *Evolvulus alsincides* and *Boerhaavia difussa*. In the post-monsoon period *Tephrosia hirta* and *Waltheria indica* were the most dominant plants in the valley. Associated with the above plants were *Indigofera cordifalia*, a wooly herb with pink flowers, *Crotalaria medicaginea*, *C. remosissima*, *Corchorus trilocularis*, *C. aestuans* and a number of grasses. Among the other common plants of the valley, mention must be made of *Indigofera enneaphylla*, *Oldeniandia umbellata*, *Portulaca oleracea*, *Justicia vahlli*, *J. difusa*, *Dipteracanthus prostratus*, *Citrullus colocynthis*, *Polycarpaea corymbose*. *Fimbristylis dichotoma*, *Borreria articularis*, *Cyperus rotundus*, *Blepheris maderaspatensis* and *celosia argentia* Linn. (Pl. IVA). A few rare plants such as *Striga gesperoides*, *S. Lutes*, *Trichodesma indicum*, *Dicoma tomentos* and *Mollugo cervians* grew interspersed with the above plants.

Members of the grass family flourished well in the valley, especially near the foot-hills where they formed clear associations. Near Sidduldari hills, *Heteropogon contortus* and *Chrysopogon fulvus* formed large associations while *Perotin indica*, *Aristida adscencionis* and *Eragrostiella bifaria* were the dominant grasses in other places. The less common grasses were *Tetrapogon tenellus*, *Chloria barbata*, *Eragrostis tenella* var. *plumosa*, *Echinochloa colona*, *Dactyloctenium segyptium*, *Apluda mutica and Eleusine indica*.

The plants that constituted the shrubby growth in the valley were *Cassia auriculata, Tephrosea hiria, Lepidagathis cristata, Securinega leucopyrus, Capparis stylosa, Helictere isora, Zizyphus mauritiana* andsVitex negundo. A pubescent undershrub *Waltheria indica*, with yellow flowers occurs abundantly at the foot-hills. Near Sidduldari hills *Melhania hamiltoniana* with its orange coloured flowers and *Solanum pubesecens* were the dominant plants, the latter forming large populations. The valley was devoid of tree growth (Pl. IVB) except a few like *Wrightia tinctoria* var. *rothii*, *Salvadora Borassus flabellifer*. *Salyadom persica* is a small sized tree, growing to a height of 20 feet and is always found in moist, sandy soil.

A kind of marsh vegetation, composed mostly of sedges and a few herbs was noticeable near the river side. Important sedges are *Scirpus maritimus* var. *affinis*, *Fimbristylis ferrugines*. *Bacopa mounieri* grew in large numbers near the side of a streamlet. Its associates were *Ammania baccifera, Stemodia viscosa* and *Polvgala erioptera*. *Acanthospermum hispidum* and *santhium Strumarium* were the two principal plants, growing near the river side.

B. FOOT-HILL VEGETATION

The vegetation was composed of thorny shrubs and climbers which constitute a typical scrub-jungle, throughout the foot of the Nallamalai hills and even on the slopes. *Acacia latronum* (Pl. V.A), *A. chundra* and *Dichrostachus cinerea* were the principal and dominant, thorny, xerophtic plants. *Grewia rotundifolia* was another shrubby tree, found all over the foot-hills as well as on the slopes. This plant is noted for its abundance as well as edible fruits. The fruits are collected and eaten by the local Lambadi tribe. Another prominent shrub that grew with *Grewia rotundifolia* was *Premna latifolia* var. *mollissima*. Associated with *Acacias* and *Dichrostachys* were two, large, shrubby *Euphoribias*, namely *Euphorbia antiquorum* and *E. nivulia*. A few undershrubs were not uncommon such as *Waltheria indica, Pavonia Zevlanica* and *Indigofera hirsuta*. These shrubby plants were covered with a number of climbers such as *Cissus quadrangularis, Asparagus racemosus, Cardiospermum halicacabum, Abrus precatorius, Sarcostemma acidum, Blastania garcipii, Coccinia ordifolia*, etc. Herbaceous undergrowth is made up of *Dipteracanthus prostratus, Justicia glauca, Hibiscus micranthus, Eragrostiella bifaria, Asrva monsoniae* and *Glossocerdia hosvellea*.

C. THORN FORESTS ON THE HILL-SLOPES

The slopes of the Nallamalai hills, which completely surrounded the valley are well-drained. The soil is made up of red sand and loam. Such plants which can thrive in drought, grew well on the slopes. The floristic composition at lower elevations is more or less similar to that in the foot-hills (Pl. V.B). *Grewia rotundifolia* was again the most dominant plant, growing in large numbers along with *Euphorbia antiquorum, E. nivulia*. (Pl. IV.C) *Premna latifolia* var. *Mollisima* and *Zizyphus eonoplia*. A number of climbers grew well on the thorny shrubs and they were *Cissus quadrangularis, Cardiospermum halicacabum, Iponoea obscura, Sarcostemma acidum, Rivea Hypocrateriformis* and *Merremis aegyptica*. *Pavonia Zeylanca* and *P. odorata* (Pl. V.C) were the two noteworthy herbaceous undershurbs, found everywhere in the slopes. Herbaceous plants which grew well under the shade of the above plants were *Cyanotis tuberosa, Hibiscus micranthus, Commelina longifolia, Cleome felina* and a number of grasses.

D. DRY DECIDUOUS FORESTS ON THE HILL-TOP

The top of the Nallamalai hill range is peculiarly flat enough for long distances and the vegetation is largely made up of dry, deciduous trees. The trees identified in the area under survey were mainly *Bauhinia racemosa, Albizia amara, Cassia fistula* and *Commiphora mukul. Mundulea sericea*, a shrubby tree was the most dominant plant here, occurring in large populations. A few shrubs such as *Parleria acumminata, Capparis sepiaria, Carissa spinarum* and *Jusmipum auriculatum* were not uncommon. The ground cover consisted of grasses such as *Cymbopogon flexuosus* and herbs like *Dipteracanthus prostratus, Averva monsoniae* and *Justicia glauca.* The flora, thus, is the typical ecological association of scrub jungle-deciduous forest, and semi-xerophytic, in consonance with the climatic and edaphic factors obtaining and including herbaceous annuals and perennials thriving in the relatively more humid shade, and in the valley, and semi-aquatic marsh vegetation on the river side. This floristic feature would be generally in common with what would be found in such tropical situations with low annual precipitation in south India. Some of the trees, shrubs and herbs are of economic value.

IFAUNA OF NAGARJUNAKONDA VALLEY

THE SKELETAL REMAINS DISCOVERED AT NAGARJUNAKONDA CLEARLY INDICATE THAT FROM Neolithic times men started domestication of animals and used them in agricultural and other pursuits.

Neolithic fauna represent the animal species of *Bos indicus* Linn. (the Zebu), *Bubalus bubalis* Linn. (the water Buffalo), *Bos gaurus* H. Smith (the Indian Bison), *Ovis vignei* Blyth. race. *domesticus* (the sheep), *Capra hircus aegagrus* Erxl. (the goat) *Antelope cervicapra* Linn. (Black-buck) *Boselaphus tragacamelus* Pall. (blue Bull), *Cervus duvauceli* cuv. (Barasingha) *Cervus unicolor* (the Sambhar), *Axis axis* Erxl. (the spotted Deer), *Hystrix cristata* (Porcupine). The long horned and short horned variety of the zebu in Neolithic economy is of fascination. Polished stone age economy present the idea of domestic animals and wild animals. The carnivorus animal assemblage is not met within the habitation site. This suggests docile harmless animal association with the Neolithic folk.

The animal bones that were found associated with the man of megalithic culture were *Bos indicus* Linn. *Bubalus bubalis* Linn. *Capra hircus aegagrus* Erxl. and *Ovis vignei* Blyth race. *domesticus*.

The discovery of *Equus caballus* Linn. (Pony) as an adjunct of Asvamedha by one of the Ikshvāku Kings and further *Elephas maximus* Linn. (The Indian Elephant) elsewhere in the valley leave to us to understand their kingly enterprise and suzerainty. Evidently, the green pastures on the slopes of the hills of the valley and beyond, attracted large number of animals from early times. Even to this day agriculturists and cattle breeders of the plains of Guntur and Nellore Districts send their animals for grazing to these hills in Nallamalai ranges during summer months, when fodder becomes scarce in the plains. The fauna of the valley, thus, is in no way different from that of Kurnool and Nellore Districts. The donkey and the bull served as the beasts of burden while goats and wild pigs were used for food.

The wild life in this valley is also varied and interesting. Though the valley with its shrub jungle could not have been a regular spot for any vigorous game, its proximity to a source of perennial water-supply and prey, wild animals like tiger, chita, panther, bear etc. are seen visiting the valley. These having sated their hunger normally return to their more congenial homes in the thickness of the forests of Srisailam hills. Bison and sambhar, which are also seen in this valley are sometimes hunted for their skins, the latter is also caught while young and domesticated and used in agricultural operations.

Birds of this valley have not been studied systematically by any ornithlogist so far. The varieties of the birds seen here afford a very rich field for any student of this study. Though it is not definite whether it attracted any birds from foreign countries which migrate

seasonally, the varieties observed are quite large and interesting. Some of these varieties like peacocks and patridges are killed for eating by the local people.

Nagarjunakonda, as the name would justify, is a congenial home for all varieties of snakes. Cobras, white and black, pythons and vipers of various colours and stripes which are deadly poisonous have been noticed in this valley. The local people are greatly scared of one variety of viper locally called *Chetturiki pamu*. This snake is very thin, has a tringular head, and jumps from one tree to another. Since it is so thin and agile, it is difficult to kill it with a stick. Pythons, though comperatively harmless, are seen in large numbers, and one of these varieties called locally *Dasari Pamu* is considered to be sacred and is even reared by local people inside their granaries. Some of these snakes are caught by the snake-charmers, who make it a source of livelihood, while others collect the cobra-skins which are discarded by the snakes when they give new sheath once or twice during the season and sell them to the townsmen. Snake-skin is also an item of export from the valley and these are also used in archives as preservatives of ancient manuscripts. Snake-bites are very common but no fatal case was reported during the period of excavations. The sub-joined table shows the variety of fauna in the valley.

ANIMALS

Lion monkey *(Innus silenus)*	..	*Konda muchhu*
Madras monkey (*Macacus radiatus*)	..	*Koti*
Slender lemur *(Loris gracilis)*	..	*Devangu pilli*
Indian horse-bat *(Hipposideres speoris)*	..	*Gabbidayi or gabbilam*
Common mush shrew *(Sorex caerulescens)*	..	*Chunchu yeluka*
Common Indian Otter *(Lutra nair)*	..	*Nirupilli or niru kukka*
Tiger *(Felis tigris)*	..	*Peddapuli* or *ibbandigandu*
Rusty-spotted cat *(Felis rubiginosa)*	..	*Namali pilli*
Common jungle cat *(Felis chaus)*	..	*Jangu pilli*
Hunting leopard *(Felis jubata)*	..	*Chiratapuli* or *mekachirata*
Striped hyaena *(Hyaena strista)*	..	*Kornaganda* or *Kornasigandu*
Lessor civet cat *(Vivverra Malaccensis)*	..	*Punugu pilli*
Madras mongoose *(Herpestes griseus)*	..	*Mantava* or *mungisu*
Indian wolf *(Canis pallipes)*	..	*Todelu*
Jackal *(Canis aureus)*	..	*Nakka*
Wild dog *(Cuon rutilans)*	..	*Rechukukka*
Indian fox *(Vulpes Bangalensis)*	..	*Ronka-nakka* or *guntanakka*

BIRDS

Black vulture *(Otogypa calva* Scopoli*)*	..	*Nalla borava*
White scavenger vulture *(Neophron percnopterus* Linnaeus)	..	*Tella borava*
Peregrine falcon *(Falco peregrinus* Gmel)	..	*Bhyri dega*

Shahin falcon *(Falco peregrinator* Sundevall*)*	..	*Javolum*
Spotted eagle *(Aquila naevia* Gmelin*)*	..	*Nallagadda,* i.e., black kite
Black eagle *(Neopus Malaiensis* Reinwardt)	..	*Adavinalla gadda,* i.e., jungle black kite
Maroon-backed kite *(Haliastur Indus* Bodd*)*	..	*Garutdalvar or garutumantudu*
Short-eared owl. *(Otus brachyotus* Gmelin)	..	*Chinna gudla guba*
Rock-horned owl *(Urrua bengalensis* Franklin*)*	..	*Yerragudla guba*
Dusky-horned owl *(Urrua Coromanda* Latham*)*	..	*Nalla gudla guba*
Jungle owlet *(Athene radiata* Tickell)	..	*Adavipaidi ganta*
Brown hawk owl *(Ninox scutallatus* Rffl)	..	*Paidiganta vestam*
Southern green pigeon *(Crocopus chlorigaster* Blyth.*)*	..	*Pacha guva*
Common peacock *(Pavo cristatus* Linnaeus*)*	..	*Nemali* or *navali*
Grey partridge *(Ortygornis Ponticerians* Gmelin*)*	..	*Kavunzu*
Large egret *(Herodias alba* Linnaeus*)*	..	*Pedda tella konga*
Little egret *(Herodias garzetta* Linnaeus*)*	..	*Nalla mukku konga*
Cattle egret *(Buphus coromandus* Boddt*)*	..	*Svati konga*
Barred-headed goose *(Anser Indicus* Gmelin*)*	..	*Pedda batu*
Black-backed goose *(Sarkidiornis melanonotus* Pennant*)*	..	*Juttu batu,* i.e., comb goose

SNAKES

Leptophis pictus	..	*Chetturiki pamu*
Whip snake *(Coluber mucosus)*	..	*Jerri pamu*
Viper	..	*Katteda*
Viper	..	*Katla pamu*
Python	..	*Konda sila* *Konda chiluva*
Cobra *Nai lutescens*	..	*Nagu pamu*
Green snake *Colober mycterizans*	..	*Pasirika pamu*
Viper	..	*Penjara*
Viper	..	*Penu katteda*
Viper	..	*Poda penjara*
Viper	..	*Potta penjara*
Viper	..	*Rakta penjara*
Viper	..	*Sikhandi*
Viper	..	*Tati bolugu*
Dipsas trigonata	..	*Tati katteda*

The fauna is further enriched by riverine animals of *Pisces* (fish), crocodiles, *chitra* (tortoise), *Lamellidens* (Mollusca) etc.

II GEOLOGY

THE SOLID GEOLOGY OF THE NAGARJUNAKONDA VALLEY IS MADE UP OF THE ARCHAEANS (including Dharwars), post-Archaean basic intrusions and Cuddapahs occurring in the same stratigraphic order, the Archaeans being the oldest rocks.[1] The lithological components of these Indian geological series may be briefly stated as follows:

Geological main division	States	Rock types
Pleistocene and Recent		Pebble-beds, talus deposit, sand, alluvium etc.
Kurnool System	Palnad	Limestones
Cuddpah System (Krishan Series)	Srisailam	Quartzites with intercalated shales.
Post Archaean		Dolerite dykes
Archaean		Pink and grey granites with associated pegmatites and quartz veins, Granite gneiss.
	Dharwars	Hornblende schists, quartzites, etc.

A. ARCHAEANS

The basement rocks of the Nagarjunkonda valley are the pink and grey granites (Pl. VIA) or granite-gneiss (Pl. VIB) of the Archaeans which enclose here and there small bands of hornblendic schists and quartzites of the Dharwar Series (Fig.2). These are massive and less jointed and, there- fore, well suited as foundation rocks for the construction of the dam. In general, the weathering of these rocks in the river-bed is limited to a depth of 2 to 3 m. from the surface, but on the higher levels, away from the river-bed, it is much deep, sometimes even over 10 m. The granites are coarse-grained and essentially rich in hornblende.

Intrusive into these oldest rocks are the veins of pegmatite and quartz. The pegmatites are very coarse-grained rocks containing large crystals of pinkish felspar. Beauti-

[1] P.S.N. Murthy, *Geology of Nagarjunakonda and its environs*, Andhra University (Waltair, 1959).

ful outcrops of granites and pegmatites (Pl. VIIA) can be noticed on the right bank of the river near Site 9. The quartz veins are very numerous and vary in size from veinlets of a few millimeters in width to massive reefs (dykes) measuring 200 to 300 m. across and sometimes traceable to a distance of one and a half to three km. They have mostly north-south and east-west trends, which are also the common joint directions of the granite-gneisses. Being composed exclusively of pure white or slightly fleshy or grey-coloured quartz mineral the larger intrusions resist erosion and thus stand out as conspicuous ridges or small hillocks (Pl. VIIB) in a flat valley floor. One huge quartz reef occurring about 400 m. to the east of the Peddakundelugutta measures about 40 m. in length and 10 to 12 m. in breadth (Pl. VIIIA). Its quartz is mostly crystalline, and some of the crystals have perfectly developed faces. It should be mentioned here that the microlithic sites of this valley were invariably found located in the neighbourhood of the outcrops of vein quartz as the tools of this category had often been made out of such raw material.

B. BASIC INTRUSIONS

The other intrusive rocks in the valley are the dolerite or trap-dykes which cut through the gneisses and quartz veins. They occur as piles of spheroidal boulders forming low ridges in the granite country. The rock is dark in colour and hard, and breaks with a rough conchoidal fracture. The dykes vary in width from a meter to as much as 50 m. and some of them can be traced for over one and a half kilometers in a general NW.-SE. trend. As many as half a dozen dykes were noticed within the Nagarjunakonda valley. The neolithic implements found in this area are made exclusively from the dyke rock (Pl. VIIIB & IXA).

C. CUDDAPAH SYSTEM

Next in succession are the rocks of the Krishna Series of the Cuddapah formations composed of quartzites, shales and limestones. They occur in the higher levels of the valley and unconformably capping the granites. The elevation of the contact between these sedimentary rocks and the underlying crystalline granites rises gradually from east to west. In the Nagarjunakonda valley and at the dam-site the junction is traceable to a height of about 150 m. Towards the north-east of the valley, near Veerla Bodu, the unconformity is marked by a thin bed of conglomerates containing quartz pebbles embedded in a ferruginous matrix.

In the valley these rocks attain the maximum thickness of about 50 m. On account of low angle of dip (less than 5° to the east) they form extensive plateau with marginal steep scarp-cliffs facing the valley.

The quartzites, locally called Srisailam quartzites, are hard and compact, medium to fine-grained and light-grey to pink in colour. When broken, the rock shows sharp edges and conchoidal fracture. They are well-bedded rocks with the thickness of the individual bed varying from 1 to 2 m. Besides the commonly-occurring massive beds of this type, thinly-bedded quartzites, each bed having less than 0·5 m. thickness, are also not uncommon. The rocks are very well joined by three sets of joints; the two sets of intersecting joints

approximately at right angles, follow respectively N 70° E and N 70° W directions. These two sets of joints together with the third along the bedding facilitate the breaking of the rocks into rectangular blocks. The vertical joints are also responsible for developing ravines and deep gorge-like features in this area.

The structural features like cross-bedding and ripple marks can be noticed in several outcrops of these rocks. On account of its hardness, typical conchoidal fracture and resistivity to erosion, the quartzites were the chief raw material employed in the manufacture of palaeolithic artefacts, which as will be seen in the subsequent sections abound in the Nagarjunakonda valley.

The shales do not form thick beds but generally occur as intercalations within the quartzite beds with a thickness rarely exceeding a meter. They are arenaceous in composition, and grey-coloured or sometimes possessing reddish or dull pink shades. They are finely laminated and soft, and have the same structural features like strike, dip and joint-system as those of the quartzites with which they are associated (Pl. IXB & XA). When exposed on the scarp-faces on the edges of the plateaux, the shales, on account of their fragile nature, are subjected to comparatively faster erosion than the overlying and underlying tough quartzite beds (Pl. XIA). This differential erosion gives rise to the formation of cave-like openings frequently observed at higher slopes flanking the river bed (Pl. X B). However, none of these caves has so far yielded any Stone Age remains.

The limestones are the youngest geological formation in this region. But no outcrops of these rocks occur within the Nagarjunakonda valley.

D. SURFACE DEPOSITS

The only other geological formations in the area are the surface deposits like pebble-beds, talus debris and fine sand and alluvium. Accumulations of pebbles, some of them of bouldery type, are noticed in the river-bed where they form pebble-islands, pebble-bars or low embankment features, as well as along the bank as shingle beaches; all these are water-laid deposits. The talus material occurs generally at the foot of steep cliffs which flank the river-bed (Pl XIB). Its composition is varied and the constituents are of different sizes. A kind of undulating land-form is developed on these surface deposits. Geologically, the deposits are of much later age but since various Stone Age industries have been discovered in association with them, at least some of them, particularly the pebble-bed encountered in the excavation which yielded hundreds of palaeoliths, must be of the Pleistocene period; this, however, cannot be firmly established for the fossils have so far not been found in the valley. The rest of such deposits, within which are found microliths, neoliths etc., belong to the Holocene or the Recent period.

IV. GEOMORPHOLOGY OF THE KRISHNA VALLEY AT NAGARJUNAKONDA

THE KRISHNA VALLEY AT NAGARJUNAKONDA WAS A SITE OF MORE OR LESS CONTINUOUS habitation from the prehistoric to the early historical periods as borne out by numerous archaeological finds discovered in the course of explorations and excavations in the valley (Pl. XIIA.) In other words, it contained archaeological records of nearly 200,000 years. The preference of the Nagarjunakonda valley for habitation by the man in different ages is a clear proof that this valley met all his basic needs quite satisfactorily. As is well-known, settlements of any period are generally controlled by three fundamental requirements of man, viz., food, water and shelter.[1] These three factors necessarily depend on geographical setting of the valley, which, in turn, is governed by the combined action of local geological formations, climate and river erosion. A geomorphological study of these aspects of the Nagarjunakonda valley may, therefore, form a suitable background for recording events of its past human history. Since this valley is shaped by the Krishna's short survey of its earlier course, before describing the morphology of Nagarjunakonda proper will not be out of the place.

Amongst the peninsular rivers the Krishna (Pl. XIIB) stands second only to the Godavari in length but has the largest overall catchment area. With its major affluents like the Bhima, the Malaprabha and the Tungabhadra together with their numerous small tributaries it commands the largest drainage area (2,44,800 sq. km.) in the Deccan.

Rising on the eastern high spur of the Western Ghats, just north of the hill-station Mahabaleshwar, it crosses, with a south-easterly course, the peninsula from west to east. The earliest portion of its basin, mesuring nearly one-third of its total length, is on the Deccan Trap, and, accordingly, the region exhibits the typical lava topography. The water-divide in between the Krishna and the Bhima rivers in the north is essentially 'a mesa and butte landscape', while in the south the river develops a meandering course bordered on both flanks by gentle swells of lava and alluvial plains.[2]

The landscape is varied in the area wherein the Bhima, the Ghataprabha and the Malaprabha join the Krishna. Being underlain by the lavas, the Krishna basin here displays locally peneplained surfaces, while the region in which lie the valleys of its tributaries is chiefly composed of sedimentary rocks of the Kaladgi Series and the resulting topography is thus of residual table-lands and ridges.[3] All the streams, however, have broad meander-

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[1] Vidal de la Blache, *Principles of Human Geography*, London, 19—22 p. 281.

[2] C.D. Deshpande, 'Certain Anti-Dip Stream Patterns in the Krishna Basin', *Bombay Geographical Magazine*, vol. III, No. 1(1955) pp. 11-13.

[3] C.D. Deshpande, *Western India* (Dharwar, 1948), pp. 115—16.

ing valleys characteristic of mature stage. It is to be noted here that the above are the broad landscape patterns of the Upper Krishna valley regions. The detailed local land-forms in the area are, however, governed by the available gradient, minor geological variations such as petrological and structural peculiarities of the rocks in the valleys and local rainfall.

The source region of the Krishna receives nearly 660 cms. of annual precipitation, while the rainfall decreases to a low mark of 51 cms. in the vicinity of its confluence with the Malaprabha.[1] The variation in rainfall has great influence on the stream-valleys. Every year during the monsoons they discharge large volume of water the erosion caused by the swollen flood waters is, therefore, enormous.

When it enters the granitic region of the erstwhile Hyderabad State, its valley develops intense meandering pattern and the country shows typical granitic land-forms of piles of boulders resulted under subaerial spheroidal weathering and fractures. A veneer of red gravelly *murum* occurs everywhere and except the flood-plain area—which is covered by alluvial deposits and hence, a fertile cultivable land—the vegetation here is mostly of scrub varieties. The paucity of annual rainfall, which amounts to only 51 cms. accentuates the semi-desert character of this region.[2]

The further course of the Krishna north of Kurnool is through the Cuddapah formations of sedimentary rocks. A change in its earlier south-easterly trend takes place in this part with a shift towards the east. The topography here is much varied At intervals the Krishna flows through deep gorge-like valleys, composed of resistant quartzites and sandsstone outcrops, and when it rests on the underlying crystalline formations its bed is shallow and wide. The hill features are commonly of the residual type.

An abrupt northward turning of the Krishna near *Kolimittikakayya Penta* in Palnad Taluk, Guntur District, from its earlier eastward trend may be attributed to earth movement. But it is more likely that it is due to the normal behaviour of an initial stream formed on the gently dipping quartzite plateau guided by the principal joints which have N-S orientation.[3] In course of time the gradient was more favourable in youthful stage. This young consequent later on captured the waters of the old eastward flowing stream and the resulting river thus assumed its present pattern.

This straight northward course of the Krishna is through deep gorge and thereafter, it enters into a trough-like valley of Nagarjunakonda. A quick change in the river-gradient in this valley had not stopped finally and even before the submergence one could see the rapids little below the Yeleswaram temples on the left bank. Hereafter, until beyond the point where the Krishna has been bunded, the valley was broad and flanked by the steep-sloped hills composed of quartzites. Besides the main Krishna valley there are several short, but fairly broad, valleys of small young streams draining into the Krishna from both the banks and the entire group of these main and subsidiary valleys form a complex-pattern. On leaving the Nagarjunakonda valley, the Krishna flows eastward. This change in the

[1] R.V. Joshi, *Pleistocene Studies in the Malaprabha Basin* (Poona, 1955), pp. 14—15.

[2] H.D. Sankalia and R.V. Joshi., 'Man in the Arid and Semi-Arid Regions of the Peninsular India,' *Bulletin of Deccan College Research Institute* Poona, Vol. 18 (1957), pp. 123—131.

[3] Joshi, *op. cit.*, (1955) p. 7; C.A. Cotton, *Geomorphology* (1945), p. 89.

direction of the current is brought about by the stream, the Pedda Vagu, which, on account of its comparatively high gradient, has pushed the northward flowing Krishna waters to the east. There is also a possibility that this shift is due to faulting.[1]

The valley at Nagarjunakonda proper was in the form of a crescent with the Krishna forming the chord and measured nearly 8 sq. miles. On the east, it was bound by the Macherla plateau on quartzites with its escarpment side facing the river.

The trough-like valley form is characteristic of a mature landscape. The river-bed within the Nagarjunakonda area lay exclusively on the granitic formations on which it was well-graded. Only with an enhanced strength during monsoons the river did a little work of shifting and redepositing of the shingle deposited earlier. At other times of the year, the river action was negligible. Within the valley, although the slopes were quite moderate, the river had not deposited any appreciable quantity of flood loam. Perhaps, after changing its earlier course through a gorge, its forceful waters in floods did not facilitate precipitation of silt in the valley.

Nothing can be said about the initial drainage formed on the crystalline basement rocks of the area. The stream development caused on the low dipping sedimentary rocks of the Cuddapahs, however, must have followed the dip directions and got modified by the existing numerous joints in the rocks. The trellis type drainage, characteristic of the gently inclined sedimentary formations, is not quite apparent in the region. A part of the present drainage plan of this area is likely to have been the result of superimposed drainage.

In the absence of any geological record of later periods in the valley, the stages of evolution of the landscape cannot be followed further. The only evidence that would help in tracing the history of the landscape prior to laying down of the river-deposits on which the Stone Age man settled, was revealed in the excavation at the northern end of the valley. The excavated trenches showed a slightly uneven and steeply sloping ancient bank of the river carved out of the deeply weathered granite geniss. It was overlain by the flood gravel of boulders and pebbles containing, here and there, pockets of grit. The gravel was partially cemented and there was little or no evidence of sorting and bedding.

The upper horizons of the pebble-deposit yielded a large number of palaeoliths. The implements being fresh and unrolled seem to have got incorporated in the gravel at a stage later than that of the main period of gravel aggradation.

The absence of any other river-deposit over the tool-bearing pebble-bed would point to the fact that the river waters did not stand longer on these pebbles although they might have touched them marginally at the time of floods. The implementiferous shingle, however, was overlain by the angular debris that crept from the steep slopes of the adjacent hills. The resulting topography on this mantle was a gentle slope of less than 5°.

Similar phenomena must have taken place at a few other parts of the valley, particularly along the escarpment which might have favoured a pebble-beach of the pre-palaeolithic period although little or nothing of it had been left in the valley proper. No pebble-bed was noticed in the vicinity of the milestone 11/2 which also produced a rich palaeolithic collection. At some places in the valley, the tool-bearing pebble-bed disturbed

[1] Murthy, *op. cit.*, (1959), pp. 25—28.

by gully action exposed the tools to the surface. The nullah discharging at the north end of the valley was of a much later date than that of the palaeoliths (in a brecciated compact gravel on this nullah Ikshvaku pottery was found) and it might have thus caused erosion of the tool-bearing deposit. This also explains the occurrence of scattered artefacts in its source region, near the place where the road from Macherla used to descend into the valley, and also on its banks.

The lowest gradient of the valley had been to the north which seems to have come into effect only after the Stone Age and it might have been due to the rapid down-cutting of the channel and hence, the lowering of the local base-level caused by the powerful young stream, the Peddavagu. Earlier, the low gradient of the valley appears to have been on the west, exclusively influenced by the base-level of the Krishna.

The tool-bearing gravels had not been compacted by calcareous clays derived from the underlying granite-gneiss although the latter were very deeply weathered. The only calcareous deposit met with in the valley was in the megalithic excavations. The megalithic burial-pits were dug into a kind of tufaceous deposit. It would mean, therefore, that the marshy conditions or small lakes existed much earlier than the megalith-building activity and the calcareous muds were laid down in these water-bodies which, on drying, precipitated the tufaceous material. A major portion of the Nagarjunakonda valley remained free from stagnated river waters, thereby affording suitable dry land for settlement purposes throughout the prehistoric and historic periods.

A mature aspect of the land-form was apparent from the trough-like valley-forms, well-developed debris-slopes, graded stream profile, absence of any conspicuous knick-points, meandering river channel and cut-offs in the meanders resulting in ox-bow lakes, shingle bars and shingle islands.

The erosional levels or terraces were not quite visible at Nagarjunakonda. The 5 ft. contour map of the valley, however, faciliated detailed analysis of this landform. As the area above 450′ contour falls mostly under the steep scrap slope and as 350′ is the lowest level in the valley the area-height and hypsometric curves (fig. 3) were plotted only for the land lying between 350′ and 450′ contours.[1] The results are interesting.

The area-height graph shows extensive surface between 400′ and 420′ contours with subsidiary maximum at 380′ and 360′. The hypsometric curve is much more instructive. It displays the average slope at each altitude and, taken together, gives an idea of the resultant slope in the valley.

On the whole, the slope is characteristic of a graded landform of mature stage but brings about very clearly the break at an altitude of 500′. This level of 400′ seems to have been favoured by the neolithic, microlithic and megalithic settlers as all these remains occurred either within it or on its fringes.

[1] For methods see, A. Miller, *The Skin of the Earth* (London, 1953), pp. 65—70.

V. GEOCHRONOLOGY

EIGHTEEN SOIL AND ROCK SPECIMENS WERE RECEIVED FROM SIX DIFFERENT SITES AT NAGARjunakonda. These are from the early historic, neolithic and microlithic sites. Almost all the specimens were mechanically analysed by sedimentation method. A short description of the method follows. For greater details a reference to British Standard is invited.

Fifty grames of the dried specimen were put in a mixer and stirred thoroughly. The same was then transferred to a one thousand c.c. measuring cylinder and filled up with distilled water. The grains were allowed to settle freely and their specific gravity read after a lapse of ½, 1, 2, 4, 8, 15, 30, 60, 120, 240, 1680 minutes or till the specific gravity became stationary. Percentage and grain size were calculated mathematically. A cumulative curve was drawn, the median read and the sorting coefficient calculated.

The colours of the specimens were seen and described in the laboratory.

The pH was noted with the help of litmus paper and phenolphthalein.

Phosphate was determined by Lorches' method i.e. 2 gms. of the specimen was put in a beaker and 5 cc of 3 N sulphuric acid added. It was put on water bath for about half an hour, and the colour of the solution was compared with the standard solution.

The organic matter was determined by sulphuric acid—dichromate method, where 1 to 2 gms. of the sp. are added to 4 cc of 1N $K_2Cr_2O_7$ and 8 cc of conc. H_2SO_4, kept over night, added 40 cc of N/10 $FeNSO_4$ & tiliated with N/10 $KMnO_4$.

The carbonate was tested with the help of dil. HCL.

The discussion on the various sites follows site-wise:

1. SITE No. 23 (Fig. Nos. 4, 5 & 6; & appendix C)

The soil samples from this site appear to be from the earth around the *stupa*. Its properties are described below :—

(i) *Mechanical Analysis*—The specimens may be described as silty sands. In sp. Nos. 2 & 1, one finds 18 and 28 percent of fine silt portion while in the sp. No. 2 fine silt is not to be found. Here it contains 40% of Medium silt. The median for sp. No. 2 is 0·06 while in Sp. Nos. 3 & 1 it is 0·04. The Sp. Nos. 3 & 1 are decidedly finer than the sp. No. 2. May be that the upper layers are the product of weathering of the lower layer. The sorting coefficient of the bottom sp. is 1·34 while for the upper layers 6·06 and 5·68 which may support weathering of the Sp. No. 2.

(ii) *Colour*—The colour of all the sps. is grey which may be due to the presence of Ca-Carbonate (?).

(iii) *pH*—All the specimens are alkaline but the real significance of this property can be discussed only when an actual determination of this value is made.

(iv) P_2O_5—The absence of phosphate may indicate absence of bones etc. in the soils.

(v) *Organic matter*—The values are 2·94, 3·72 and 3·48 increasing from bottom to the middle layer indicating perhaps larger percentage of plant roots etc. in Sps. Nos. 1 & 3.

(vi) *Carbonate*—This may be due to the presence of lime stone (?) pieces in the soil.

2. Site No. 45 (Fig. Nos. 7 & 8; & appendix C.)

(i) *Mechanical Analysis*—In both the sps. fine silt and clay are absent. The semi-weathered rock appears to be finer in grade as shown by its median is 0·04 mm. The median for the layer bearing microliths is 0·07. This increase in coarseness may perhaps be accounted for by the presence of pottery pieces in the soil. Both the sps. are however badly sorted.

(ii) *Colour*—The upper sp. is blackish brown and the lower is brown. Darker colour of the top layer may again be due to pieces of pottery baked in reduced atmosphere.

(iii) *pH*—Both the sp. are alkaline.

(iv) P_2O_5—There is no phosphate present in the soil. The same may be devoid of any bones etc.

(v) *Organic matter*—The presence of 3·74 and 3·72 percent of organic matter, may be due to the presence of roots, leaves etc. in the soil.

(vi) *Carbonate*—No carbonate is found in the layers, this may be due to the absence of calcareous matter.

3. Site No. 53—(Fig. Nos. 9 to 12; & appendix C)

(i) *Mechanical Analysis*—The increasing coarseness from bottom to the top seems to be peculiar and appears to be difficult to account for, in view of the geographical position of the site. The median indicates the same as above. The sorting is poor in Sp. Nos. 4 & 3, medium for Sp. No. 2 and good for Sp. No. 1.

(ii) *Colour*—The colour of all the Sps. is Brownish red and may, to some extent, indicate maturity of the soil. This may also show a weathering on the soil in a temperate climate.

(iii) *pH*—All the Sps. are alkaline but its real significance may not be accounted for until actual measurements of the same are carried out.

(iv) P_2O_5—No phosphate is present indicating absence of phosphatic material.

(v) *Organic matter*—Organic matter in three bottom layers is almost the same while the top layer contains a bit less. This may be due to lesser percentage of plant remains in the soil, or due to the oxidation of the same due to heat.

(vi) *Carbonate*—Absence of carbonate may indicate absence of calcareous matter in the soil.

4. Site No. 46 (Fig. No. 13; & appendix C)

(i) *Mechanical Analysis*—This sp. contains the sand grade, the silt grade and the clay grade, and may be described as loam. The median is 0·03 mm. The sorting coefficient is 5·47 which indicates that the soil is badly sorted. The soil might have been left over to the agents of denudation for a pretty good length of time, in view of the generally coarse nature of other soils and if this has been a product of weathering of granitic material.

(ii) *Colour*—The whitish brown colour may be due to the presence of the carbonate of calcium (?).

(iii) *pH*—The significance of alkalinety of the soil is described below.

(iv) P_2O_5—There is no phosphate present in the soil and indicates absence of the phosphatic material.

(v) *Organic matter*—The percentage of organic matter is 3·63 which may be due to the plant remains etc.

(vi) *Carbonate*—The presence of carbonate in the layer indicates the presence of some calcareous matter.

(i) *Mechanical Analysis*—Sp. No. 2 of site 46 consists of sand, silt and clay grades and may be described as loam while Sp. No. 1 of site 47 is sandy silt. In Sp. No. 2 of 46 contains 42% of sand 55% of silt and 3% clay. In Sp. No. 1 of 47 these percentages are 32, 68 and 0 respectively. Median for Sp. No. 1 of 47 is 0·01 while it is 0·03 for Sp. No. 2 of 46 Sp. No 2. of 46 is badly sorted while Sp. 1 of 47 shows a medium sorting.

(ii) *Colour*—Both the Sps. are whitish brown.

(iii) *pH*—Both the Sps. are alkaline.

(iv) P_2O_5—Both the Sps. are devoid of phosphate.

(v) *Organic matter*—The percentage of organic matter is both the Sps. is 3·63.

(vi) *Carbonate*—Both the Sps. contain carbonate material.

In view of the above it is observed that there is a general similarity between the two sps.

5. SITE No. 46–A (Fig. Nos. 14 to 18; & appendix C)

(i) *Mechanical analysis*—The decrease in coarseness from bottom Sp. No. 1 to Sp. No. 4 is quite conceivable and shows a natural process of weathering but from Sp. No. 6 the coarseness increases which is remarkable. If the sps. are from the pit filling, it is conceivable and may be due to the coarser material used by the neolithic man to fill up the pit but if the sps. are from the regular layers it is some what difficult to explain. The medians of the sps. support the above. The sorting coefficients of all these sps. are medium.

(i) *Colour*—The brown colours are perhaps due to the presence of organic matter while the grey and greyish white due to the presence of calcium carbonate (?).

(iii) *ph*—All the sps. except sp. No. 1 are alkaline. Sp. No. 1 is neutral perhaps because it was intact—a solid piece from the rock.

(iv) P_2O_5—Sp. No. 1 has 1% of the phosphate and the same may be due to some accessory mineral in the rock.

(v) *Organic matter*— Organic matter varies from 2·81 to 3·74 and may be due to the presence of plant remains.

(vi) *Carbonate*—Its presence indicates the presence of the calcium carbonate in general.

6. SITE No. 47 (Fig. Nos. 19 & 20; & appendix C)

(i) *Mechanical Analysis*—Here again the natural gravely layer contains 68% of silt while the upper layer contains only 51% of silt. The lower layer is therefore fine. The medians for these two sps. support this view. Coming to the sorting, it will be observed that Sp. No. 1 shows a figure of 4·20 while is is 3·16 for the overlying layer. The lower layer is comparatively poorly sorted, though in geological terms both of them show a medium sorting.

(ii) *Colour*—The colour of Sp. No. 2 is greyish white which may be due to the presence of Ca-Carbonate (?) Sp. No. 1 is again light coloured which may again be due to the presence of Ca-Carbonate.

(iii) *pH*—Both the specimens are alkaline.

(iv) P_2O_5—Sp. No. 2 contain 2% of P_2O_5 while Sp. No. 1 is devoid of phosphate. Phosphate in Sp. No. 2 may be due to bone ash which may be present in view of the colour of the Sp.

(v) *Organic matter*—The percentage of organic matter in the specimens is 2.0 & 3·63 respectively in Sp. Nos. 2 & 1 and may be due to the presence of plant remains etc.

(vi) *Carbonate*—This is present in both the specimens and may trace its origin from some calcareous rocks. This does not appear to be significant here.

CONCLUSIONS :

1. *Site No. 23*—In view of the properties exhibited by the soil specimens it would appear that the soils do not show maturity, and may not be older than 'Recent.'

2. *Site No. 45*—In view of the probable movement of fine, material downwards and other properties exhibited by these sps., it appears that the site is comparatively older than site No. 23, but it may not be older than 'Holocene'.

3. *Site No. 53*—The only criterion worth consideration here appears to be the red Brownish colour of the soil which might have been due to oxidation of the ferruginous

component of the soil and this might have taken quite some time. In view of this the site does not appear to be older than 'Holocene'.

4. *Site No. 46*—The spread of the cummulative curve and whitish brown colour of the soil is worth considering. These two properties of this specimen No. 2 may indicate a bit of weathering and may not be older than 'Holocene'.

5. *Site No. 46-A*—Clay and the fine silt grades are absent in this case, the reason of which cannot conveniently be accounted for in the light of the present studies. In any case it shows absence of a considerable weathering. As for the colour, it is lighter where there is carbonate present otherwise it is darker. It is really worth noting that a soil on the east of the pit is so different from the one on the west side of it. Any way in view of the properties exhibited by the specimens of this site, it would appear to be of a period of not older than 'Holocene.'

6. *Site No. 47*—If ash, in particular if wood ash, is present in the soil it may indicate a site of fire place used by humans for cooking. In case it is bone ash it may indicate a cremation ground. Here also the soil is generally coarse. The lighter colour can again be attributed to the presence of carbonate matter and all these properties combine, go to indicate a 'Holocene' period for this site also. If the presence of P_2O_5 is due to bones, it might have been used as a dumping ground for bones etc.

On any reckoning, in view of the above the conclusion that the sites 45, 53, 46, 46-A and 47 may belong to Holocene while the site 23 to the Recent, appears to be inescapable.

Regarding the climate, alkaline nature of the soil may indicate a temperate climate with a rain fall of about 71·12 cm. to 91·4 cm.

Regarding the mode of formation of the soils, the properties exhibited by the soil specimens go to show a fluviatile origin and/or a residual one.

VI. EARLY STONE AGE

A. INTRODUCTION

REMAINS OF EARLY STONE AGE REPRESENTED BY LOOSE STONE ARTEFACTS WERE SPREAD over a large part of Nagarjunakonda valley, now submerged under water. Yet they escaped the notice of the earlier scholars until their discovery in the year 1956 by K. V. Soundara Rajan who, in fact, inaugurated the study of these artefacts;[1] he carried out his ground-survey in the year 1956 and the results have already been published.[2] Subsequent survey and investigation were undertaken in the years 1959-61 by the Nagarjunakonda Excavations Project working in close collaboration with the Prehistory Branch of the Survey, and emphasis was laid more on the collection of stratigraphical data than on typological studies.

In the course of this survey, several trenches were dug in different parts of the valley and the exposed sections were re-examined. They do not bear any site-number although a number of them formed part of other sites—historical and protohistoric. From the point of view of stratigraphy and collection of tools, Site 128, in Sector N.XXIV, in the north-western corner of the valley, proved to be the most fruitful. Five trenches, in a row each 20 ft. square, were laid in the narrow strip between the Siddhuldari hill and the river Krishna; the cuttings traversed along the profile of the contours 320 ft. to 350 ft. This was the only site which revealed a large number of artefacts in a more or less reliable stratigraphical context.

The other important group of trenches was the one excavated in Sector XXIII near the foot of the Phirangimotu hill. Here palaeoliths rested in a thin tufaceous deposit over a layer of disintegrated *murum*. Although of no stratigraphical value, these trenches yielded artefacts of types slightly more developed than those recovered from Site 128. However, the stratigraphy of the Early Stone Age cultures in general and that of sites in particular can be understood in the light of what has been said in the preceding pages about the geological and geo-morphological setting of Nagarjunakonda.

B. STRATIGRAPHY

The Nagarjunakonda valley proper and the adjoining valleys at Yelleswaram and Veerla-Bodu yielded innumerable paleolithic artefacts on the surface or from the loose

[1] A. Ghosh, ed., *Indian Archaeology 1956-57—A Review* (abbreviated as *IAR*), p. 78.

[2] K.V. Soundara Rajan, 'Studies in the Stone Age of Nagarjunakonda and neighbourhood', *Ancient India*, No. 14 (1958), pp. 49—133.

surface soil.[1] Their concentrations in the valley were noticed (i) in the area adjacent to the mile-stone 11/7 on the Macherla road, (ii) at the foot of the hill Phirangimotu in a more or less centrally located high ground, and (iii) on the gently-sloping surface at the confluence of the nullah with the Krishna in the north of the valley.[2] Nowhere these implements were found embedded in any gravel-bed nor were there any nullah-sections showing their burial below the surface deposits. The majority of the tools found on the surface were, however, quite fresh and unrolled. These, therefore, do not seem to have been moved much from their original position, where they were left by the early man.

On the left bank of the nullah in the south-east of the Nagarjuna hill near the road-crossing leading to the Sites 2, 3, 30, 32A and 32B a section showing cemented rubble could be seen.[3] The components of this compact mass had been angular fragments of the local rock loosely by cemented white clay derived from the underlying granite-gneiss. No tool was found in the section except the three collected previously by Soundara Rajan. As this was the only better-exposed section in the valley, a trial trench was taken through it with a view to tracing whether it was implementiferous, but without success; on the other hand, the presence of historical pottery in it proved its recent origin.

Outside the Nagarjunakonda valley, the area at the mouth of the *Peddavagu* and its course about a mile (2 km.) upstream was explored.[4] Similarly, the Yelleswaram valley was also examined to find the palaeolith-bearing deposits.[5] In all these localities, the implements were found in profusion on the surface and in the vicinity of rain-gullies crossing the talus. It was, therefore, a conjecture that the tool-bearing horizon might have been below the talus and the point required further investigation, preferably by excavation at a suitable place. This opportunity was provided in the excavation conducted by H. Sarkar in the north-east of the valley for the purpose of locating the horizon of flakes and flake-blades on quartzite, which also occurred in large numbers on the surface. In the first season's dig[6] the exposed section showed, from bottom upwards, a pebbly bed composed of water-worn quartzite pebbles resting directly on the weathered granite-gneiss and overlain by loose angular débris. There were patches of red grit or sand here and there within the pebble deposit, about 40 cms. thick, having no signs of stratification or bedding; the whole pebble mass seemed to be a torrent deposit laid down by the river in floods. On the pebble-bed and in its upper horizon fresh specimens of hand-axes, cleavers and choppers were found. The overlying débris, about 50 cm. thick, contained mostly quartzite flakes and blade like flakes and rarely bificial tools of the hand-axe category. Since so far the tools were available only on the surface their occurrence in a pebbly deposit was interesting and important, for

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[1] *IAR*—1959-60 (New Delhi, 1960), p.12, Sarkar discovered the Early Stone Age Site on a high ground at the confluence of the Peddavagu-nullah with the Krishna, near Rayavaram, in the Yelleswaram valley. The occurrence of Early Stone Age tools was noticed by Banerjee in the Veerla Bodu area to the north-east of Nagarjunakonda.

[2] *IAR*—1959-60, fig. 2, p. 5.

[3] Soundara Rajan, *op. cit.* (1958). Later on examined by the present authors.

[4] By Sarkar and Joshi and later by Banerjee.

[5] By Sarkar and Joshi and later by Banerjee.

[6] *IAR*—1959-60, fig. 2, p. 5.

here there was some trace of Stone Age stratigraphy. In the next season the excavation was, therefore, resumed and trenches were extended towards the foot of the escarpment.[1] In the same alignment, a few more trenches were also taken towards the river-bank. The stratigraphy revealed was as follows.

The underlying geological formation of granite-gneiss of greenish white colour, which was exposed to a total thickness of about one metre, showed deep weathering. The kaolinisation and subsequent removal of feldspar from the rock had brought out the quartz grains in relief and the whole mass appeared as a grit deposit. But the position of the quartz veins traversing the rock proved its weathering *in situ*. The top of this rock was slightly uneven and sloping towards the riverside at an angle of 40°.[2]

Resting directly against and partly over it was the pebble-bed; no other deposit was noticed in-between them. The sloping rock-surface was thus the ancient river-bank over which was lying the shingle heaped up by the powerful river. As the Krishna river is capable of transporting heavy boulders and pebbles, particularly in monsoons when its potential is enhanced, the accumulation of shingle of this magnitude may not mean a pluvial phase. No molluscan, plant or other animal remains were found within the pebbles which could have helped in dating their formation. As many as over five hundred tools were collected from the trench measuring about 13 x 28 x 3 m. The majority of them were recovered at a depth of 2 m. from the surface. They came mostly from the top levels of the shingle-bed and partly from the talus deposit at a depth of 1¼ m. As mentioned earlier the majority of the tools were unrolled, and hence, they might have got incorporated in the pebble-bed in the last stages of its aggradation, i.e., the pebble-deposit was earlier than the implements. It should be mentioned here that a large number of artefacts are found made of the flakes taken out from the quartzite pebbles and a few of them of the pebbles themselves. The quartzites of these pebbles and those found in the bed are identical in composition. For manufacturing their lithic tools, the palaeolithic settlers, therefore, obtained the raw materials from this pebble-deposit itself.

The river did not leave any deposit over this implementiferous pebble bed, instead there was a massive accumulation of débris. Thus there existed a stratigraphic break between the top of the pebble-bed and overlying talus-deposit. The discontinuous nature of the pebble-bed might have been due to some erosion also recorded by the occurrence of pockets of cross-bedded coarse sands. But, on the whole, the river does not seem to have played any significant part after the formation of the pebble-bed, and the subsequent talus spread was solely due to gravity. Another important evidence that this excavation provided was that the flakes and flake-blades, which occurred profusely on the surface along with the palaeoliths, were not associated with the earlier handaxe culture but were of a later date, and belonged to certain levels of the talus.

Although no climatic sequence could be positively worked out from the finds described above and revealed by the excavations, on this limited evidence, it may be tentatively stated as under.

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[1] *IAR*—1960-61 (New Delhi, 1961), p. 1.

[2] *IAR*—1959-60 (New Delhi, 1960), fig. 2, p. 5.

1. The uneven profile of the basement rock showed erosional activity. Likewise, the building of heavy shingle-bed must be attributed to increased river power. These two events perhaps revealed a heavy rainfall period, the end of which was recorded in the aggradation of the pebbles.

2. The river action later on became very insignificant. It did not bring about any sorting even of the small-sized pebbles. That was the period when the palaeolithic man appeared in this valley. The absence of any powerful river-action in the form of erosion or deposition (the tools were not rolled) might perhaps mean that that was a period of comparatively less rainfall (dry phase).

In the immediate south of the Nagarjunakonda about 150 k.m. (94 miles) away, in the valley of the Bhavanasi, opposite the village of Krishnapuram, at the western entrance of the Dornala-Atmakur Pass across the Nallamalai range, Cammiade and Burkitt observed the following section.[1] On the 10' to 12' of the shalley rock was a pebble-bed of variable thickness ranging from 3 inches to 4 ft. (average 15 inches) and this was overlain by 14' to 16' deposit of red and brown clays. The pebble-bed yielded three roughly-made rolled hand-axes on pebbles and a rostro-carinate type of tool, while flakes, two of them with faceted striking platform, were obtained from the red and brown clays. Another site on the small river Ralla Vagu is close to the village of Yerra-konda-Palem near the eastern entrance of the Dornala-Atmakur Pass. Here, although the section showed three gravel beds, only the bottom-most contained tools not of very crude variety.

Further south, near the town Giddalur, at the first site, Giddalur, the derived laterite was seen on the country rock. Cammiade and Burkitt have tentatively equated the former deposit with the implementiferous Bhavanasi gravel referred to above. The lateritic material yielded tools of Series I and II (hand-axes and cleavers) comparable to the artefacts obtained in the excavation at Nagarjunakonda.

The implementiferous horizon for the lower Palaeolithic tools occurring in this as well as at Nagarjunakonda was the same—a pebbly-bed resting on the country rock. The deposit sealing this tool-bearing bed is a talus in the Nagarjunakonda valley, while in the areas, south of it are the red or brown clays, or alternate layers of small pebbles of quartzites, sandstones and silt. At Nagarjunakonda, the talus yielded flakes and flake-blades while at Giddalur sites these were found in the red-clays.

No more climatic events can be built up from this data although on typological grounds Cammiade and Burkitt have attempted to. The five typical sites described by them and briefly dealt with above, do not seem to be useful in drawing any conclusions of this type, more so when climatic sequences of this region have been shown as comparable with the distant areas in Africa.

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[1] L. A. Cammiade and M. C. Burkitt, 'Fresh light on the Stone Age in South-east India', *Antiquity*, IV (1925), p. 330.

[2] K. V. Soundara Rajan, 'Stone Age Industries near Giddalur, Kurnool District', *Ancient India*, No. 9 (1952), pp. 64—92.

The Giddalur area was again explored by Soundara Rajan who discovered four new sites yielding tools of Series I to IV as previously described by Cammiade and Burkitt, The cliff-sections in the area showed a single tool-bearing pebbly-bed resting on the bed-rock, the overlying deposit being of river silt at Locality I and at Talapalle. On the top of the section was a loose pebble-scattering of a later date. The stratigraphy of this tract was thus not different from the one observed at Nagarjunakonda.

The only other stratigraphical study within the Krishna basin is by Joshi in the Malaprabha valley, a tributary of the Krishna.[1] The sites on the Malaprabha are situated nearly 464 km. (or 350 miles) to the west of Nagarjunakonda. In this area also there is only one tool-bearing gravel which rests on the mottled yellow clay, the latter lying directly on the rock. In most of the sections, the gravel-bed is overlain by silt, but at Taminhal two more layers of fine gravel have been observed (Banerjee found Series II in the upper gravel).[2] The gravel yielded tools of Abbevillio-Acheulian characters, as determined typologically. But comprehensively speaking, the collections represented advanced Acheulian stage of Indian Early Stone Age industries. In summary, then, the Nagarjunakonda valley has the following three tool-bearing horizons:

(i) Pebble-bed resting on the disintegrated granite geniss;
(ii) The talus overlying the pebble-bed; and
(iii) Thin surface deposit of loose brown earth.

C. THE INDUSTRIES

1. General Remarks

Inside the Nagarjunakonda valley three industries, two of the Early Stone Age and one of the Middle Stone Age, have been found in clear and distinct horizons. As mentioned above these tools were excavated from two groups of trenches, one near the river at Site 128, and the other in the high grounds, in Sector S XII, near the Phirangimotu hill (Pl. XIIIA).

The first group of trenches excavated by Sarkar, was taken in the most suitable part of the valley. Being very close to both the river and the hills this trench-group revealed the most of what could be expected in the valley. The stratigraphy, dealt in detail in the previous section, is breifly as follows :

1. Surface soil, containing few microliths, resting more or less unconformably on talus deposits ;
2. Talus deposit of shingles containing Middle Stone Age Tools—the deposit resting unconformably on the pebble deposit below ;
3. Pebble deposit containing tools of the Early Stone Age, and
4. Basal granitic *murum*.

The second group of trenches was excavated by Banerjee, in the high grounds of the valley in Sector S. XII. Being fairly away from the river and, at the same time, not being

[1] Joshi, *op. cit.* (1955), pp. 35—40.
[2] *Ibid.*, pp. 29—31.

so close to the hills the deposits were of completely different nature. Here the trenches revealed a clear horizon of one Early Stone Age (Acheulian) industry. The deposits are as follows (Pl. XIIIB & XIV) :

1. Surface soil, containing minute pieces of pot-sherds, resting unconformably on the deposit mentioned below :
2. A thin deposit of calcareous tufa, containing tools of the Acheulean industry, resting on brecciated sandstone;
3. Brecciated sandstone; and
4. Basal granite.

2. The industry from Site 128

(a) General observations

It has been mentioned that the Early Stone Age tools of the Site came from the pebble bed. The quartzite pebbles of this bed are covered by a thick mantle of dark brown patina. The artefacts, however, are unpatinated. The tools, were therefore manufactured considerably after the aggradation. Apparently, the horizon of this industry should be somewhere between the pebble bed and the overlying talus deposit whence some of the tools percolated into the pebble bed.

Besides the deposits in the trench, Sarkar's excavation is also important for another reason. It revealed two clear-cut industries and the tools of these were neither mixed up with the tools of any other industry nor among themselves. This is significant. Its importance can be easily comprehended when compared to the other collections, which to all intents and purposes are surface-collections where chances of mix-up of industries are indeed very great.

For this very reason the Early Stone Age industry excavated by Sarkar has been treated elaborately. More so, as this forms the basis of comparison with other collections from Nagarjunakonda. The industry depended entirely upon the river-rolled quartzite pebbles for the supply of the raw material. Pebbles of sizes, which could yield tools with lengths varying between 50 mm. and 200 mm. breadths between 25 mm. and 150 mm., and thickness between 15 mm. and 130 mm. were available in good numbers among the pebbles of the bed from which these tools were excavated. Local availability of the raw material should, therefore, be clearly established. As stated before, the industry originally rested directly over the pebbled bed, whence it percolated inside the bed. It is, therefore, a normal assumption that this was a factory site and that tools were being manufactured at the very site where the desired raw material was in abundance. There are, however, four difficulties in establishing this assumption. The first difficulty is the absence of sufficient number of waste flakes. In fact, too few are recorded for an industry yielding nearly a hundred handaxes and more than a hundred cleavers. The second difficulty is the absence of unfinished tools in different stages of manufacture, retaining varied extents of original pebbly surface, indicative of the as yet unworked portions. The third difficulty is that there is not a single core showing even a single flake scar of dimensions big enough even for the

smallest of the cleavers or the handaxes of the assemblage. The fourth difficulty is concerned with the flakes of the assemblages. These flakes certainly do not look like waste flakes. On the contrary, they show a range of potential pieces to be fashioned into regular tool-types. In addition to this we must also consider the fact that this industry does not contain the small flake-tools, viz., points, characteristic of all Upper Acheulean industries.

The above arguments lead us to suppose that, if at all, the site was a sort of secondary factory site where pieces already in desired manufacturing stage were brought to be given the final finish. The possibility is, therefore, that this was some sort of living or home-site. For, it is not certain whether a secondary factory site can independently exist. There is, however, no positive indication of this being a home-site. Not a single bone, even uncharred, has been recovered from this site. The problem, therefore, remains unsolved and the location of the primary factory site remains unidentified.

This again opens up a further issue. A site with abundance of raw material in most desirable shapes and forms could be a secondary factory site only when the pebble bed was inaccessible to the workers by having been covered by some other débris, during the time when the tools were being manufactured. This débris could be in the form of the talus material which had since been decomposed and might have been either washed away or percolated into the gravel bed along with the tools. The postulation conforms to the pattern of continuous process of deposition of the talus material and explains the apparent contradiction of our rationalization about the existence of period signifying disconformity. The débris could have been in the form of *murum* deposit similar to the ones found in other localities in the valley where the flats were largely due to the differential deposition of this *murum*, the causes of which have been discussed in the previous section.

The industry clearly belongs to the Acheulean phase of the Chelles-Acheul industry. The primary flakes were detached from the pebbles almost invariably in the block-on block technique. Most of the specimens do not show any platform. For such specimens the flattish part of the pebble was almost invariably selected wherever possible. This had resulted in some flakes being end-flakes and some side-flakes.[1] In some specimens some sort of platform could be seen. These were obtained by the utilization of a fracture, natural or deliberately made. Wherever the bulbar region has been left unworked or unmutilated a well-developed bulb of percussion, but rarely a sharp cone, can be seen.

The secondary retouches—in fact, any subsequent working consequent to the production of the desired flake—were done in soft hammer technique. The few waste flakes in the assemblage show shallow and greatly diffused bulbs of percussion. Their platforms became the prior flake-scars, either the primary flake surface or the scar of another secondary flake. Only when a big flake-scar was to be produced, wherein the damage done by the production of such was not unwanted, or when a fracture was to be effected, the block-on-block technique was employed for secondary workings. This, though the soft hammer technique had been extensively used, it was not the only technique employed for secondary working. Further, the series of small flake scars, often described tools, excepting

[1] There is another possible reason. The shape of the flake can be more controlled in a side-flake.

in a very few cases. Wherever they could be seen the constituent flake-scars of any particular series were too few to indicate deliberate attempts. If we have to accept this as a deliberate process, which, incidentally, entails a conscious or unconscious production of blades or blade-like-flakes, it was not standardized and, in this industry at least, appears to be eccentric. As stated before, the industry does not contain the characteristic advanced acheulean small flake-tools. In the Nagarjunakonda valley, this industry is the earliest one techno-typologically; no stratigraphic or chronological significance is being attached to this statement.

(b) *Tool-types*

This industry is composed of the following regular and irregular tool-types.

REGULAR TOOL-TYPES :

Handaxes	..	90 (17·2%)
Cleavers	..	112 (21·4%)
Choppers	..	31 (5·9%)
Scrapers	..	11 (2·1%)
	Total	244 (46·6%)

CORES AND FLAKES:

Cores	..	4 (0·8%)
Flakes	..	275 (52·6%)
	Total	279 (53·4%)

The above list at once brings home the fact of the low frequency of handaxes and cleavers even though the assemblage is somewhat of a selective nature. For, primarily, the site is a sort of secondary workshop and, secondarily, the waste flakes and rejects are not being included in the count. This proportion, however, is within the normal range wherever collections have been made in reasonable totality and not on any selective basis. If only the finished tools were included in the list the proportion would have been drastically reduced.

HANDAXES (Fig. 21 to 24 and Pl. XV).—Like all other tools, in the assemblage, handaxes are made on flakes obtained from the pebbles. Seventeen of them have retained pebbly cortex in their butt region. Of these, six show some sort of platforms: five single faceted and one with two facets. The remaining ones show the flat cortex portion of the pebble used as the platform. Of the total ninety handaxes of this assemblage, forty-two platforms: twenty-nine of them with only one facet, ten with two facets and three with three facets each. As mentioned before, these facets are mainly produced by fractures and nothing like any preparation of the core is involved on it. This is evident from the examination of angles of the platform and main flake surface.

Angle* of the platform	No. of hand-axes with one facet	No. of handaxes with two facets	No. of handaxes with three facets	Total
110°	1	1	—	2
115°	3	1	—	4
120°	4	4	1	9
125°	5	2	1	8
130°	6	1	1	8
135°	7	—	—	7
140°	3	1	—	4
Total	29	10	3	42

Of the handaxes, nineteen are made on end-flakes and twenty-three on side-flakes. In the case of the remaining ones the position of the platform-end cannot be determined. As the side-flakes have, as a corollery, longer platforms, the number of tools, with two or more platforms, are comparatively more among handaxes made on side-flakes than on those made on end-flakes.

Handaxes	With one facet	With two facets	With three facets	Total
On end-flakes	16	2	1	19
On side-flakes	13	8	2	23
Total	29	10	3	42

Only six handaxes are unifacial. The remaining ones are bifacial. All the unifacial handaxes show lesser number of flake-scars on the worked surface. Thus, while the average numbers of major flake-scars of a biface vary between ten and twelve on any one surface, upper or under, the unifacials show five to eight flake scars. It is, therefore, not improbable that the unifacials are as yet unfinished bifaces. Marginal retouches are extremely rare and only a few tools show deliberate marginal retouch. Mention should be made of at least two specimens, NK-211 and NK-302 (Fig. 22/14; 23/25). In the case of these two, more or less elaborate work has been done on the pebbly surface. If we look at the worked surface alone the tools appear as finished or almost finished specimens. The other surface (the main flake surface) presents a contrast in remaining absolutely virginal. This is important because the slightly convex main flake-surface of these specimens is offering a picture

* Measured to the nearest fifth degree

of what would have been otherwise obtained after elaborate workings. But exploitation of this technological aspect never became universal in the whole range of the Chelles-Acheul culture. In the immediately post-Acheulian industries (Burkitt's series II), this eccentricity becomes more frequent and a good percentage of lanceolate handaxes had been found with one surface elaborately worked and the other completely unworked. More often than not, the pebble being more convex, had been left untouched with a neatly-worked main flake surface. Industries in the valleys of the Gundalakamma and its tributaries show this feature more clearly.

Before discussing the shapes of the tools, a caution may be sounded. Like all tools in a factory site, most of the handaxes had not been fully finished. As such the shapes are often decided by the nearest finished shapes. Even then, more than a quarter (23) of the handaxes cannot be put into any regular category; Indeed, these tools are too incomplete. Of the finished or almost-finished tools, almond appears to be the most desired shape: thirty-four handaxes have this shape. There are thirteen ovates, of which five are elongated oval-shaped specimens while eight are lanceolate handaxes. This is an important shape in as much as five of them show either some sort of incipient tang or the beginning of tangs by making notches on the sides near the base. Of the remaining tools seven are triangular, two sub-triangular and three elongated pear-shaped.

Some technological facts may also be mentioned here. When an end-flake has been detached the cross-section at right angles to its longer axis is roughly plano-convex; the same becomes more or less triangular in a side-flake. The cross-section changes with further secondary workings on either or both surfaces. In the case of an end-flake both sides remain sharp and thin and have to be worked on to make a handaxe. As the blows, of necessity, have to be struck from the main flake surface, the next shape of cross-section to appear on an end-flake, is more or less trapezoidal. In the case of a side-flake, only one side of a flake shows sharp and thin edge and has to be worked on first. The next cross-section that a side-flake, gets is more in the nature of a parallelogram. With a little more work the tool assumes a cross-section which is often associated with such terms as Vall River or Pniel technique, even though the assumed form and cross-section is the result of a natural and inevitable process and not of a specialized technique. The final desired cross-section, of the handaxes of this industry, is bi-convex; the other shapes mentioned below are of intermediate type and only point to the unfinished character of the tool.

Handaxes	Bi-convex	Parallelo-grammatic	Plano-convex	Trian-gular	Trape-zodial	Penta-gonal
On end-flake	4	2	6	1	1	2
On side-flake	7	7	1	7	—	1
On indeterminate Flake	18	19	7	2	3	1
Total	29	28	14	10	4	4

All the tools have got well developed and often sharp lines of profile. These lines are straight, serrated, or twisted (S or Z). Serrated lines of profile generally indicate, in this industry, tools, not yet fully finished. These are, therefore, of intermediate nature, whence either a straight or a twisted line would develop. Again, both the lines of profile of any particular tool may or may not be of identical description. Following list shows the distribution of specimens in the different combinations of the two lines :

Straight/Straight	..	21
Straight/Serrated	..	20
Straight/Twisted	..	14
Serrated/Serrated	..	19
Serrated/Twisted	..	9
Twisted/Twisted	..	7

Sixty-five handaxes show moderate amount of work in the butt-end, of which thirty-seven have been made thin, thereby forming a sharp line of butt. In thirteen specimens the pebbly region has been left out partly or wholly and they are thick or thin according to the nature of the flake. Twelve specimens show pointed butt; these were made deliberately so and in five of them notching or incipient tangs can be seen. The butt-ends manifest an interesting technological process. It was generally the first part of the tool to be fashioned. In twelve specimens, however, clear indications are there to show that the butt-end remained untouched. In five cases only the butt regions show any deliberate working over the initial work to bring the specimen to a general or basic shape.

As discussed before, the making of the incipient tang has remained eccentric in this industry. However, attempt to make the tool easily haftable has become more or less standardized.

The tip, on the other hand, shows that this was the last part to be fashioned and this is in conformity with the control an Acheulean worker commands on the technique of flaking. Forty-five handaxes show rounded tip; while thick pointed tip accounts for forty-two examples. In remaining specimens, the tip part does not show even a single flake scar. Again, in twelve specimens the tip-end do not indicate the final form.

Dimensions of the handaxes are interesting in as much as they show a definite pattern and deliberation. The smallest one is 95 mm. in length and may perhaps pass as a specialized tool-type on account of its very size. But the longest one measures 190 mm. Evidently, the variation between the smallest and the longest specimens is great. But sixty-nine (76·7%) specimens fall within the range 110 mm. to 165 mm. The frequencies in the ranges, measured to the nearest fifth millimetre, are as follows :

95 mm. to 105 mm.	..	11 specimens
110 mm. to 125 mm.	..	24 specimens
130 mm. to 145 mm.	..	27 specimens
150 mm. to 165 mm.	..	18 specimens
170 mm. to 190 mm.	..	10 specimens

Similarly, the narrowest tool measures 45 mm. and the broadest one 125 mm. This wide variation is not in conformity with the general pattern. Sixty-six (73·3%) tools measure between 70 mm. and 110 mm. of which forty (44·4%) measure between 70 mm. and 80 mm. Thus the measurements themselves show a clear and deliberate restriction of breadth. While some relationship exists between the length and breadth of a tool, it is by no means, a clear case of proportional variation. The shortest tool is not the narrowest one, nor the longest one the broadest specimen. This can be explained by assuming the presence of various types of handaxes. Unfinished character of tools has not changed the measurements substantially as only the largest possible measurements have been taken for the length. Breadth and thickness have been measured at their maximums at right angles to the axis along which the length has been measured. The breadth groupings and distribution of tools are as follows :

45 mm. to 65 mm.	..	16 specimens
70 mm. to 80 mm.	..	40 specimens
85 mm. to 95 mm.	..	12 specimens
100 mm. to 110 mm.	..	14 specimens
115 mm. to 125 mm.	..	7 specimens

Thickness of the handaxes varies between 20 mm. and 65 mm. Seventy-two (80%) specimens fall within 30 mm. and 45 mm. The thickness shows certain superficial relationship with the length. Again, it is by no means a clear case of inter-relationship. The relationship between breadth and thickness is more emphatic and no reason can be scientifically put forward. The distribution of tools in thickness group is given below :

20 mm. to 25 mm.	..	10 specimens
30 mm. to 35 mm.	..	35 specimens
40 mm. to 45 mm.	..	39 specimens
50 mm. to 60 mm.	..	6 specimens
65 mm.	..	2 specimens

It should be recorded here that the available shapes and sizes of pebbles do not *per se* explain the distribution of sizes. Sizes are to a great extent deliberately controlled and the deliberation extends to the choice of pebbles for fashioning handaxes.

Cleavers (Figs. 25 to 30 and Pl. XVI A & B):—All cleavers are made on flakes struck off from the pebbles. Sixty-four (57·1%) are made on side-flakes, forty-two (37·5%) on end-flakes, and the remaining six are on indeterminate flakes. All the flakes are cortex-flakes as all but seven show original pebbly cortex in different dimensions on the upper surface of the tool; fifty-nine (52·7%) of the total one hundred and twelve cleavers have retained the striking platforms. This number is composed of more than a third of the cleavers on end-flakes and about seventy per cent (44) on side-flakes. This higher frequency of cleavers on side-flakes retaining the platform is important. It supports the observation that in a cleaver the butt-end received the attention before the body. This is further

supported by the fact that in many (20) cleavers the mid-part is practically left unworked. Thirty-four (57·6%) of the cleavers retaining platforms, show one facet, nineteen of them (32·2%) two facets and only six, with three or more facets in their platforms. as a rule, the platform of a side-flake has to be longer. The probability is, therefore, that the side-flakes would show more multi-faceted platforms than the end flakes. The following chart clearly asserts this technological truism .

Cleavers	With one facet	With two facets	With three or more facets	Total
On end-flakes	8	5	2	15
On side-flakes	26	14	4	44
Total	34	19	6	59

The angles of the platforms with the main-flake surfaces vary from 110° to 145° . Thirty-six (61%) cleavers show angles between 115° to 125°. But the measure of angles has absolutely nothing to do with the number of facets. The following chart shows the distribution of tools in different angle-groups.

Angle of the platform	No. of cleavers with one facet	No. of cleavers with two facets	No. of cleavers with three or more facets	Total
100°	—	1	—	1
105°	—	—	—	—
110°	2	1	—	3
115°	7	2	2	11
120°	6	7	3	16
125°	7	2	—	9
130°	5	2	—	7
135°	3	3	1	7
140°	2	1	—	3
145°	—	—	—	2
Total	34	19	6	59

Thirty-eight (34%) of the cleavers are bifacially worked the remaining seventy-four (62%) being unifacial ones. Unlike the handaxes, the unifacial specimens do not necessarily point to probable lack of finish. On the other hand, some (4) of the unifacial cleavers are excellent examples of fully-finished products.

Sixty-four (57·1%) specimens are U-shaped, twenty-eight (25%) V-shaped, and the remaining ones belonging to intermediate shapes. Though an apparent relationship between side-and other flakes, on the one hand, and 'U' and 'V' shaped on the other, can be read in the figures, the relationship is not real. The following chart makes the situation clear :

Cleavers	No. of U-shaped cleavers	No. of V-shaped cleavers	No. of cleavers of inter-mediate shape.	Total
End-flake	28	10	4	42
Side-flake	35	15	14	64
Intermediate flake	1	3	2	6
Total	64	28	20	112

As a rule, cleavers are better finished than the handaxes. This, by no means, indicates any superior craftsmanship. The number of flake-scars on the cleaver is less than that on a hand-axe. This difference is due to the characteristic shapes of the tools, especially in relation to the business end or edge.

Sixty-six (59%) of the specimens show the butt-region partly-or fully-flaked. A third of these (22) are kept thick and the remaining ones are made thin. Forty-six (41%) specimens show pebbly butt of which fourteen (12·5%) show pointed pebbly end made slightly thinner by very little work. The remaining cleavers, with pebbly butt-end, are thick or thin in the butt region depending on the thickness of the flake at the respective end. The cutting edge can be produced by the intersection of a flake scar with the main flake surface or by the intersection of two flake scars, one on either surface. In the former case the cutting edge may be said to have been unifacially produced while in the latter it is made bifacially. The removal of this particular flake or flakes is their characteristic and a good control is necessary for their removal. For, the very removal of the flake automatically produces the cutting edge, and no retouch is necessary for perfecting the cutting edge. On the contrary, the retouches on the cutting edge, generally, though not necessarily, indicate proportionate lack of control in the removal of the flake. The removal of this particular flake is very characteristic and is as fundamental to a cleaver as a facet to a burin. This act of removal of the particular flake, therefore, deserves a special term and the term, cleaver-stroke, may well fit in. Similarly, the flake, thus removed, may be called the cleaver-flake. As will be evident from the above discussion, there is absolutely no difference in technique or in any other factor involved, in the unifacial or bifacial production of the cleaver edge. There is, however, another alternative technique of production of the business edge of the cleaver. In this, there is no question of unifacial or bifacial flaking at the cutting

edge. In fact, there is no flaking at all so far as the production of the cutting edge is concerned. A flake is so struck off from such a pebble that the intersection of the convex surface and the main flake surface produces the most ideal cutting edge. This technique of making a cleaver is the simplest of all. Subsequent flaking or retouching is confined to the side and, to some degree, to the butt-end. Most delicate control in the initial removal of the flake is, however, absolutely essential. Sixty-seven (60%) of the specimens fall into this category and some of them form the best finished group, if such a grouping could be made.[1] Twenty-five (22·3%) cleavers show the removal of the cleaver-flake on one surface only, whereas eighteen (17%) specimens show the removal of the cleaver-flakes on both the surfaces. Only in the last case the cleaver-edge can be said to have been produced by bifacial flaking. Incidentally, two specimens are found to have been broken at the edge.

Cleavers with straight cutting edge (the cutting edge being at a right angle to the butt-edge median axis) are slightly more numerous (61·49) than the cleavers with oblique cutting edge. The cutting edge can be linear, convex, or concave; the linear edge is generally known as straight edge. Thirty-eight (33·9%) cleavers have linear cutting edges, sixty-four (57·1%) convex, and eight (7·1%) concave cutting edges. There are two specimens with cutting edge greatly damaged.

Twenty-two (19·6%) cleavers show straight lines of the profile on both sides and fifty-one (45·5%) on one side only. One important issue arises from the study of the profiles of these cleavers: The specimens with S or Z like twisted line or lines are more numerous than those with the serrated ones. In this, they differ with the handaxes. The difference cannot be attributed to the difference of technique or to the relative mastery over the technique. Lesser work at the margin explains this difference satisfactorily. Below is given the nature of the profiles of both the sides; in two cases the lines of profile could not be ascertained due to fractures.

Straight/straight	..	22
Straight/serrated	..	24
Straight/twisted	..	27
Serrated/serrated	..	12
Serrated/twisted	..	88
Twisted/twisted	..	17
Total		190

As in handaxes, the cross-sections of the cleavers indicate the tendency towards biconvexity, although a few cleavers with clear parallelogrammatic section seem to be

[1] This character is also emphatic among the cleavers of the Late Acheulean industry of the Orsand Valley. Presence of sufficient number of pebbles of optimum shapes and sizes, in the most accessible deposits, is an essential precondition for the exhibition of this delicate control on flaking. In the accompanying list there, this character has simply been marked as unifacial.

completely finished tools. The importance of these points will be clear when we discuss the finds from another locality.

Parallelogrammatic	..	27 (24·1%)
Triangular	..	16 (14·3%)
Biconvex	..	50 (44·7%)
Trapezoidal	..	6 (5·4%)
Plano-convex	..	13 (11·6%)
Total		112

As in the case of handaxes, the sizes of the cleavers show a fascinating case of prior selection of pebbles to effectively control the sizes. The shortest cleaver measures 85 mm. and the longest 180 mm. Eighty-eight (78·6%) specimens fall between 115 mm. and 155 mm. of which forty-five (40·2%) measure between 130 mm. and 140 mm. Thus, both in maximum variation and in concentration in measuremental groups cleavers and handaxes show more or less similar pattern. Following is the lengthwise measurement distribution of the cleavers :

85 mm. to 100 mm.	..	7 specimens
105 mm. to 120 mm.	..	20 specimens
125 mm. to 140 mm.	..	49 specimens
145 mm. to 160 mm.	..	30 specimens
165 mm. to 180 mm.	..	6 specimens

The breadths of the cleavers vary between 50 mm. and 150 mm. This wide range is not indicative of their concentration in measurement-groups. Eighty-three (74·1%) specimens measure from 90 mm. to 100 mm. of which fifty-nine (52·7%) measure from 90 mm. to 100 mm. Thus in breadth, the cleavers show far more concentration than the handaxes. Following is the breadthwise measurement distribution of the cleavers :

50 mm. to 70 mm.	..	9 specimens
75 mm. to 85 mm.	..	24 specimens
90 mm. to 100 mm.	..	59 specimens
105 mm. to 115 mm.	..	14 specimens
120 mm. to 150 mm.	..	6 specimens

It is, however, in thickness that the cleavers show a remarkable concentration.

This emphatic concentration immediately points to the quantum of attention the thickness of the cleaver must have received. The thinnest cleaver measures 20 mm. and the thickest 55 mm. In this the cleavers resemble the handaxes. One hundred and one (90·2%)

specimens measure between 30 mm. and 45 mm. of which seventy-four (66·1%) measure between 35 mm. and 40 mm. Following is the distribution.

20 mm.	..	1 specimen
25 mm. to 30 mm.	..	17 specimens
35 mm. to 40 mm.	..	74 specimens
45 mm. to 50 mm.	..	19 specimens
55 mm.	..	1 specimen

It should be noted here that the relationship between length, breadth and thickness is comparatively insignificant. The longest cleaver is neither the broadest nor the thickest. Similarly, the shortest one is neither the narrowest nor the thinnest.

CHOPPER (Figs. 31 & 32 and Pl. XVIIA): Only thirty-one choppers were found, of which seven are unifacial and the rest bifacial. The unifacial choppers, like their counterparts in any other industry, have a more or less flat undersurface when the blows were struck to remove flakes from the convex surface. This is what has often been called tangential flaking and has been given a special technological status. As will be evident, to anyone who tries to fashion a tool, flaking in general and Acheulean flaking in particular has also to be very close to the tangential flaking, especially on a cortex-flake having a convex upper surface. The term tangential flaking, though valid on technological grounds, has been over emphasized by the special status given to it to make them out as the standard-bearers of some extremely specialized industry. If this association cannot be broken the use of the term itself may possiblily have to be restricted. The bifacial choppers show alternate-flake-scars. This is also a normal technological requirement if any progress has to be made in the extent of the area of work. All these choppers are made on pebbles and the original pebbly surface can be seen extending over one to three quarters of the total upper surface of the tools. The flat-undersurface of the unifacial choppers are pebbly in three specimens while main flake surface are to be seen in four specimens. Two to eight flake-scars can be seen on either surface of choppers: these flake-scars measure 26 mm. to 50 mm. in length and 16 mm. to 30 mm. in width. As no small flake-tool corresponding to these measurements was found, these choppers cannot be termed as simple cores so far as this industry is concerned.

SCRAPERS (Figs. 31 & 32): There are eleven scrapers. Besides the vague criterion of size, the scrapers in this industry have been separated from the choppers primarily from the point of view of the character of flaking or retouch. These scars are small enough to be termed retouches, and there is no possibility of these specimens being simple cores. Four of these scrapers are unifacial and seven bifacial. The unifacial specimens have flat under-surface, pebbly in two cases and showing the main flake in the rest. No specialized form can be seen but the unifacial discoid variety, with scraping surface practically all round, seems to be more or less standardized. Pebbly cortex can be seen in all but one specimen.

CORES: There are four cores, three on pebbles and one on a cleavage block. The three on pebbles show flake-scars indicative of corresponding flake-blades. As discussed before, the conscious, production of flake-blades was unknown. Besides, no flake-blade was found in the assemblage. It is possible, therefore, that these three have come from the pits or

hollows representing later dissection of the gravel-bed by subsequent streamlets. If this possibility is accepted, as the dissection of the gravel bed has been established, the cores belong to a phase intermediate between this Acheulean industry and the capping blade industry. The fifth core shows bigger flake-scars, but again does not fit in with the typology of this industry. Not a single tool of this industry could be fashioned from a flake removed from this core. On the other hand, the core certainly does not suggest that it was intended to be fashioned as a tool itself. Again, this may belong to a later industry. The other alternative that this one may be a chopper cannot also be upheld, for there is no edge. Flake-scars and their axes clearly indicate that the flakes were removed from this core simply to get flakes and not to fashion the pebble into a tool.

FLAKES : Two hundred and seventy-five flakes were found. These account for more than half (52·6%) of the total collection. Of these one hundred and eighty-five are simple flakes and ninety show marginal retouches. No small chips or waste flakes are recorded in the collection.

The simple flakes show a clear relationship between the size of the flake and the technique employed to detach it from the pebble. All but the smaller flakes were detached by the block-on-block technique. While the term 'smaller' does not denote any qualitative distinction it is considered necessary not to overemphasize the point and to keep the flakes with border line measurements more or less undefined with regard to their dimensions.

The side-flakes outnumber the end-flakes to the ratio of about 3:1. This is significant, and once the forms of the pebbles are studied, the explanation is not very difficult to find out. For pebbles of oval or egg-shaped, with round or almost round cross-section, it is more convenient to give the detaching blow at the side. In this way, more control can be exercised on the production of the flake, as the width (i.e., narrower diameter) of the pebble has to be tackled and not the longer axis. Thus, the area of resistence being lessened, the blow may be so controlled that it does not become too strong to break the pebble nor it may be too feeble to produce either a crack or an ineffective hinge-fracture.

The retouched flakes cannot form an essentially separate category for two interacting reasons. The retouch is neither intense enough to make them scrapers nor has it, in anyway, changed the outline of the flake. This separation has been maintained only to emphasize the beginning of the marginal retouch on a simple flake before shaping the concerned flake to any tool-form. This character is important in as much as it constitutes the specific technology of the culture-complex popularly called series II, especially in its earlier facies. This character has already assumed normal standardization in this Acheulean industry.

The smallest retouched flake is 40 mm. long and the length of the smallest simple flake is 50 mm. The biggest flake measures 200 mm. One hundred and seventy (92·2%) of the simple flakes and eight-two (91·1%) of the retouched flakes show length-measurements corresponding to the whole range of cleavers. Similarly one hundred and sixty-five (89·2%) of the simple-flakes and seventy two (80%), of the retouched ones correspond in length to the whole range of handaxes.

Following is lengthwise distribution-table of the flakes, both simple and retouched.

Range in mm.	No. of simple flakes	No. of retouched flakes	Total
45 to 60	2	1	3
65 to 80	11	7	18
85 to 100	43	23	66
105 to 120	55	24	79
125 to 140	46	20	66
145 to 160	20	12	32
165 to 180	6	3	9
185 to 200	2	0	2
Total	185	90	275

The above table clearly shows concentrations within certain ranges in length corresponding almost exactly to those of handaxes and cleavers.

The narrowest flake measures 40 mm. and the broadest 160 mm. In the breadth measurement, all but three simple flakes and all the retouched flakes correspond to that of the cleavers; similarly, all but two simple flakes and all but one retouched flake correspond to the handaxes. The breadth grouping is as follows :—

Range in mm.	No. of simple flakes	No. of retouched flakes	Total
40 to 55	7	7	14
55 to 65	25	13	38
70 to 80	53	34	87
85 to 95	62	19	81
100 to 110	26	15	41
155 to 125	10	1	11
130 to 160	2	1	3
Total	185	90	275

It is evident from the above table two hundred and nine (76%) flakes measure between 70 mm. and 110 mm. As mentioned before, 73·3% of the handaxes and 82·2% of the cleavers also fall within this range. Similarly, 31·6% of the flakes fall within the range 70 mm. and 80 mm. among handaxes this range accounts for 44·4% of their number. One hundred and one (36·7%) flakes measure between 90 mm. and 110 mm. which favourably compares to the 52·7% of the cleavers falling whthin the same range.

The thinnest flake measures 15 mm. while the thickest one measures 70 mm. The following table gives their distributional ranges of thickness :

Range in mm.	No. of simple	No. of retouched	Total
15 to 20	29	7	36
25 to 30	78	28	106
35 to 40	68	50	118
45 to 50	7	5	12
55 to 70	3	—	3
Total	185	90	275

Over 74% of the flakes fall within the range 30 mm. and 45 mm., which correspondingly accounts for 80% of the handaxes and 90% of the cleavers.

The angles between the main flake surface and striking platform vary between 100° and 145°. One hundred and twenty three (66·5%) simple flakes show angles between 120° and 130°. Following is the distribution of the flakes on the basis of angles, measured to the nearest fifth degree.

Angle	No. of simple flakes	No. of retouched flakes	Total
100°	3	1	4
105°	4	2	6
110°	10	6	16
115°	23	17	40
120°	33	24	57
125°	43	24	67
130°	47	10	57
135°	10	5	15
140°	9	1	10
145°	3	—	3
100°—145°	185	90	275

D. THE INDUSTRY FROM SECTOR S. XIII

1. General Observations

The relics of the Early Stone Age have been found practically throughout the valley. These, being surface finds have not been taken into any special account. Mention has to be made, however, of the fact that in certain Sectors these were found in clusters. Here, only

a small group of tools recovered from the excavations in Sector S XIII has been taken into account. As previously described, the palaeoliths here rested over the disintegrated granitic *murum*, a thin deposit of calcareous tufa forming the horizon of these tools. This bed was again covered up by disintegrated *murum*, secondarily deposited. This covering deposit contains small pieces of potsherds; also on the surface could be seen palaeoliths in large numbers as well as scattered tufa material. Thus, despite the fact that the excavated palaeoliths were restricted to a thin tufaceous layer, the layer itself had no stratigraphic value. Yet, the excavated palaeoliths from these trenches show a well-knit group and are probably undisturbed by the admixture of artefacts belonging to other industries. In their typo-technological characteristics they appear more advanced than the industry described before. Making a fairly rational assumption that the technologically advanced stage cannot coexist with the earlier within the same valley, especially when they are found in different clusters without any admixture, the industry may perhaps be taken to be chronologically later than the one described before. Again, there is no positive record.

2. The tool-types

The number of excavated tools is, however, small and is not of any significance for statistical treatment. The industry is composed of the following :

Handaxes	..	12 (17·6%)
Cleavers	..	6 (8·8%)
Choppers	..	29 (42·6%)
Scrapers	..	21 (30·9%)
Total		68

The absence of flakes in the collection is very much emphatic. There is no clear explanation for this absence. Only probable explanation may be that flakes could not be carried to this place as the source of raw material, i.e., the river gravel, was quite some distance away.

The second point to be noticed is the high frequency of choppers. In the former industry, choppers were insignificant in number but in this industry they account for about half of the collection. This factor is of extreme importance, not only in itself, but in its implications especially vis a vis the Soanian.

Similarly, the increase in the frequency of scrapers has to be explained. Lastly, as a corollery, the handaxes and cleavers record a drastic drop in frequency.

In the previous industry, more than half of which being flakes, only, handaxes account for 17·4% of the assemblage. The percentage rises to about 37% when the flakes are excluded. As this industry does not contain simple flakes the latter figure has to be taken into account for the purpose of comparison. The handaxes are less than half in the present industry compared to those recovered from Site 128.

Cleavers record a still greater fall. When the flakes (simple and retouched) are excluded, the industry from Site 128 is seen to have contained about 46% of cleavers. This

can be compared to the frequency in this industry, which is about 9%, i.e., a reduction by more than four-fifths. These factors, i.e., frequency of the handaxes and cleavers, is of special significance.

HANDAXES (Fig. 33 & Pl. XVIIIB): Altogether twelve handaxes were found. All of them were worked bifacially, all but one were made on flake. In case of one tool, a pebble appears to have been fashioned into a handaxe. Two were made on side-flakes, three on end-flakes, and in the remaining cases, due to secondary workings, actual nature of flake cannot be determined. These however show extensive use of marginal retouches in finishing a tool. Even in bringing the flake into a proper shape marginal retouches had sometimes been exclusively used.

CLEAVERS (Fig. 34): The cleavers of this industry were more developed typo-technologically and exhibit finest possible workmanship. The tendency to make the cross-section a perfect parallelogram can be seen. Two of the six cleavers are 'V' shaped, three 'U' shaped and one of intermediate shape. Four cleavers show that the business edge had been produced by the removal of a cleaver-flake on one surface. Two specimens were produced without the removal of any cleaver-flake.

CHOPPERS (Figs. 35 & 36): Out of twenty-nine specimens in this collection, five are unifacial ones and the rest bifacials. These specimens are not very different from those found from Site. 128.

SCRAPERS (Figs. 35 & 36) : Out of the total twenty-one scrapers, unifacial and bifacial specimens are eleven and ten respectively. The increase in the unifacial types points to their affinity with the post-acheulean industries where unifacial types predominate. The typewise distribution of the scrapers is as follows:

1. Side-scrapers with single business edge—4 specimens
2. Side-scrapers with double business edge—4 specimens
3. End-scrapers with slightly convex edge—9 specimens
5. Round-scrapers with business edge all-round—5 specimens

E. SUMMARY AND CONCLUSIONS

1. The Stone Age industries of Nagarjunakonda began with the Acheulean in two different facies which occurred in two clear horizons. Typo-technologically, the earlier one was found in the mixed deposit of shingle, gravel where the site was subjected to the direct action of the river. The advanced one was found in a thin deposit of calcareous tufa in the high ground of the valley. The stratigraphic relationship between these two deposits cannot be determined. There is, however, one somewhat suggestive evidence. While discussing the stratigraphy of the earlier industry we inferred, not with much positive evidence, that the industry was manufactured during a comparatively drier

phase. The calcareous tufa on the other hand, would point towards a comparatively better condition, and the related industry later, chronologically.

2. Almost without any exception the tools of the Early Stone Age (Acheulean) industries had been fashioned from the flakes struck off the quartzite pebble. All these flakes were cortex-flakes. It is, therefore, evident that no preparation of core was involved. In fact, more often than not the core should have had only one flake scar, a feature responsible for our failure to collect a single one of the cores which had yielded the flakes for fashioning handaxes or cleavers. Levallois, in all its manifestations and ramifications can, therefore, safely be excluded from the Early Age of Nagarjunakonda.

It is, however, true that some prepared cores were found in the early post-Acheulean industry. This industry came from the adjacent valley of Veerla Bodu; a few scattered tools of this industry were also found at Nagarjunakonda. Such tools may easily get included within the tools of the Acheulean industries when pure surface-collections form the basis of a study.

3. The study of choppers (including chopping tools) has brought out a significant fact. The choppers show an increase in frequency with the advancement in technology. Following is the comparative statement :

Industry from	Frequency (among regular tool types)			
	Handaxes	Cleavers	Choppers	Scrapers
1. Sarkar's trench Site 128* (Earlier Acheulean)	37% (90)	46% (112)	12·7% (31)	4·5% (11)
2. Banerjee's trench (Advanced Acheulean) Sector S. XIII	17·6% (12)	8·8% (6)	42·6% (29)	30·9% (21)

The above statement, based as it is on the finds from undisturbed horizons, cannot be overemphasized even though the size of the second sample is considerably small. The inevitable conclusion is, therefore, to discount a possible pebble industry substratum of the peninsular Acheulean industry. This conclusion will remain valid till it is reasonably proved that it is based purely on a localized and not a generalized phenomenon.

*The qualifying adjectives earlier advanced are strictly meant for the industries within the Nagarjunakonda Valley. These have only been used in relation to the two industries and in absolute terms.

VII. MIDDLE STONE AGE

A. INTRODUCTION

WE HAVE ALREADY MENTIONED ABOUT THE OCCURRENCE OF A MIDDLE STONE AGE industry at Site 128, in Sector N. XXIV. The location and stratigraphy of the site have already been discussed before, and it would suffice here to say that the tools were recovered from above the shingle deposit of the talus overlying the pebble bed in Sarkar's trenches. Such tools came also from the surface in the course of exploration inside[1] and outside[2] the valley. At Nagarjunakonda, there were two main areas of concentration—the one near site 53, a Late Stone Age site in Sector XXVII, and the other near Site 64, a temple of the Early Historical period, in Sector XIV. Both the areas were more or less high grounds, the areas falling between heights 400 ft. to 450 ft. M.S.L. The thick formation of calcareous tufa could be noticed in these areas underneath the top soil.

Only twenty-seven specimens were discovered in the course of excavations at Site 128,[3] while one hundred and twenty-seven came from the surface. Significantly, there is no difference in type, technique, forms or even in measurements between the excavated material and the surface finds. For the purpose of this report all the one hundred and fifty-four specimens of long blades and tools fashioned on such blades have, therefore, been dealt with as a single collection.

B. GENERAL OBSERVATIONS

All the tools from Site 128 came from a deposit over-lying the talus. It was an irregular deposit with depressions here and there. One such depression was actually found to have cut through the width of the trenches, and probably represented a nulla and not isolated hollows. It was by no means a dugup pit of the later period. Here a significant question that arises would be why, far the larger number was found in the depression, which had occupied a lesser area, while so few came from the covering deposit? At present it is difficult to pin-point the reason. In all likelihood the industry as well as the nullah belonged to a phase posterior to the accumulation of the talus material. Another significant point that we can deduce from the distribution of tools on the surface is that the industry might have come into existence after the formation of the calcareous tufa; in other words, the valley in that period was largely free from marshy condition prevailing since the time of the Early Stone Age of Nagarjunakonda.

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[1] *IAR*—1960-61 (New Delhi, 1961), p. 1. These tools, collected by Sarkar, have been described therein as comparable with those of Series II.

[2] Collected by Banerjee mainly from Veeria Bodu, an adjacent Valley. The report of these finds is being prepared separately.

[3] Such tools occur along with the microlithic assemblage ascribable to the Late Stone Age period.

The adjacent valley, Veerla Bodu, also now submerged, brought to light a Middle Stone Age industry which, typo-technologically, preceds the one found at Nagarjunakonda. Suffice it here to say that the industry is characterized by its extreme vigour and that it exhibits all the preconditions necessary for the standardization of tool-types. Yet, the industry as a whole cannot claim to have attained any specialization. Such an industry is susceptible to quick changes. It is, therefore, not unlikely that different clusters from different regions in the neighbourhood of one another may show between themselves moderate to substantial variation. Our preliminary study of different clusters gives a picture substantially resembling the post-Fauresmith industrial outburst in central and southern Africa. It is Fauresmith again with which the earlier or the Veerla Bodu phase of Middle Stone Age industry appears to be homotaxial.

One of the changes that the earlier Middle Stone Age industry exhibits is, a tendency towards the production of blades, the germ of which we have already seen in the Acheulian itself. The later Middle Stone Age industry, the one discovered at Nagarjunakonda, is also primarily based on blade-flake. The long blade which represents the ultimate specialization was incapable in itself of any further development. The long blades were, therefore, likely to linger on considerably after the implicated industry itself had been subjected to modification or decay. It is likely that such blades might have remained associated even with many later industries which may not appear to be very logical.

With the finding of the four industries, two of the Early Stone Age and two of the Middle Stone Age, an inescapable question may instantly arise as to whether they are in any way genetically related to one another. We have seen that there is no reason to suppose that the two Acheulean industries are not related in the evolutionary set-up. Like-wise, the genetical relationship of the two Middle Stone Age industries can hardly be overlooked. There may be such a possibility though it will not be proper to make such a suggestion without fully studying the earlier Middle Stone Age industry from Veerla Bodu.

In this context a special mention of another aspect of the Stone Age archaeology of the region can be made here. It will be about the related fossils and the habitation site. Rather surprising has been our failure to locate any habitation site or even come across a single fossil with which the first question will also be related. Because it has been so inspite of painstaking search the phenomenon would demand some *ad hoc* rationalization. The only possibility is that the tool makers remained in open-air sites and did not fix up even any semipermanent abode. The surface being continuously denuded there had been no scope for fosilisation of bones. However, search has still to be continued, perhaps away from the river beds. Once again we must focus our attention on the Kurnool caves in spite of repeated frustrations we have had hitherto.

C. TOOL-TYPES

The Middle Stone Age industry from Nagarjunakonda is found composed of blades and tools fashioned on such blades; quartzite being the exclusive raw material used. The industry is composed of the following types (Figs. 37& 38).

1. Point .. 78 (50·6%)
2. Side-scraper .. 11 (7·1%)

3. End-scraper	..	7	(4·5%)
4. Hollow scraper	..	3	(2·0%)
5. Knife	..	7	(4·5%)
6. Borer	..	5	(3·2%)
7. Blade	..	19	(12·3%)
8. Flake-blade	..	16	(10·4%)
9. Flake	..	7	(4·5%)
10. Axe-like flake	..	1	(0·6%)
Total		154	

POINTS : Points constitute the largest group of the assemblage, with seventy-eight specimens they account for more than half of the total strength of this industry. Most of the points are triangular in shape obtained by obliquely snapping the blade. Only three points were found to be made by thorough retouch. This oblique snapping, however, has not imparted a regular recurring shape to the tool. Thus while the shapes and forms of the points were non-standardized, the oblique snapping had already achieved standardization as a technique.

So far as retouching is concerned very few tools show retouches throughout. The following list is illustrative :

Retouched region		*Number*
Only margin	..	13
Both margins	..	5
Tip and base	..	2
Tip, base and one margin	..	1
Tip, base and two margins	..	5
Only tip	..	3
Tip and one margin	..	8
Tip and both margins	..	20
Only base	..	nil
Base and one margin	..	2
Base and two margins	..	1
Practically without retouch	..	18
Total		78

Evidently, the technique of retouching remained non-standardized. While these were produced by chipping, perhaps with a billet, the blows had been struck from both surfaces at random. Thus, a part of the margin may show the retouch on one surface while the remaining part may show from the other. This character is very common in the Nevasian non-quartzitic Middle Stone Age industry of the Deccan.

In most of the specimens there is an attempt to make the base suitable for hafting. The method most met with was by the production of notches on the sides near the base. Eleven specimens show the notch on one margin only while five show corresponding notches on both the margins. Two specimens show attempts to make the base thinner by removing small flakes. Besides, points with moderately-developed tangs are fairly common. Eight such specimens were found while ten specimens showed the incipient tang. Points with fully developed tangs have not been discovered here.

The points vary from 35 mm. to 105 mm. in length. More than seventy per cent, however, measure from 50 mm. to 70 mm. while the narrowest and broadest points measure 25 mm. and 80 mm. respectively, more than four-fifths of the total number measure between 35 mm. and 50 mm. Thickness varies from 5 mm. to 30 mm. but more than ninety-two per cent measure between 10 mm. and 20 mm. points with thickness of 15 mm. account for about half of the total (Pl. XVIII A & B).

Side-scrapers: There is nothing particular to mention about these side-scrapers. These are non-descript and were made mostly on flakes, rather than on blades.

End-scrapers: End-scrapers, as a rule, were better finished specimens than side-scrapers. These are mostly on thick-blades or flake-blades. The retouches are steep at the end region. The margins were, however, retouched all along in most cases.

Hollow-scrapers: There were only three hollow-scrapers. These were well-made specimens apparently meant for fashioning shafts. The concave region was not necessarily retouched. The chippings found almost invariably at the working edge may be more due to use than retouching.

Blades, flake-blades and flakes: The blade, flake-blade and flake, though very much akin to each other, show certain characteristic differences. The blade betrays its manufacture from a core showing parallel flake-scars. Such cores, on the flaked surface, resemble fluted cores. The flakes, on the other hand, show their detachment from some sort of prepared core. The flake-blades, generally, are thick blades. One character, however, is worth noting : most of the flake-blades are side-flakes that is, their platforms are on a longer side and the blows had been struck along the shorter axis.

Knives: These are blades with one margin thick, sometimes retouched and the other margin sharp. In four of the specimens (out of a total of seven), the distal end was curved by re-touches. In this it resembles the pen-knife blade of the microlithic tradition in form.

Borer: Five borers were found in the assemblage. The end of the flake had been retouched to bring out the short business point.

VIII. LATE STONE AGE

A. INTRODUCTION

THE LATE STONE AGE INDUSTRIES EXCLUSIVELY REPRESENTED BY MICROLITHIC IMPLEments were found in the excavations of Sites 45-A and 53. Both these sites in their upper layers yielded remains ascribable to the microlithic times. Besides, there were surface-collections which have been divided into five localities. Localities A, B, C, D and E—according to the areas of concentration in the valley. It may be stated that microlithic tradition had its continuity even in the neolithic phases of Nagarjunakonda.

Site 53, perhaps earliest of the two excavated sites, had two clear horizons—the lower one associated with Late Stone Age industry and the upper with tools of neolithic culture. The former was dominated by crescentic tools like crescentic backed blades, crescentic points and lunates; also there were triangles and trapezes, arrow-heads or points, burins, and scrapers. Thus, it is clear that the industry had a dominant geometric tradition, other pronounced features included high proportion of retouched blades. On the other hand Site 45-A, clearly a factory site, was dominated by unretouched blades, and implements. It also yielded backed blades, retouched and unretouched lunates and other crescentic tool-types points or arrow-heads, scrapers, and burins. The absence of true geometric shapes,[1] the high frequency of unretouched tools and dominance of blades are technological features that mark the identity of the industry of Site 45-A in contradistinction to that of Site 53. Whether these technological differences have any chronological import is not altogether evident in the absence of any datable associates or superimposed cultural deposits. But a relative sequence can reasonably be inferred on the grounds of detailed typological studies.

In evolving this sequence we have, perforce, to take into account two significant factors: the occurrence of flake-blades in both the industries and the characteristics of microlithic implements associated with a definite neolithic industry. Without any doubt, the flake-blades represented the continuity of the Middle Stone Age tradition. For instance, the technique of snapping one or both ends of a blade in the Late Stone Age horizon is clearly the continuation of the Middle Stone Age technology. At Site 53, quartzite flake-blades occurred in all the levels with their concentration in the lowest deposit overlying the natural disintegrated rock. These are mostly unretouched and similar to those recovered from a post-talus deposit at Site 128. Extremely significant was their association with waste-flakes, thereby indicating that these were manufactured at the site proper along with tools of Late Stone Age. This fact may suggest the association of flake blade with the Late Stone Age assemblage, at least at Site 53. Flake-blades were found intermingled with microliths in Site 45-A, Localities C and D but their relationship could not be established with certainty. The evidence from Site 53, however, suggest that the flake-blade tradition, in some

[1] Some authors include lunates among geometrics. Here they have been excluded.

form or other, continued even in the Late Stone Age. Moreover, the length and size of some of the quartzite blades or tools conform to those belonging purely to the Late Stone Age industry. All these suggest the possibility of the origin of the Late Stone Age industry from the Middle Stone Age as already postulated by Banerjee.[1] At Nagarjunakonda, blade tradition survived even in the neolithic period. An interesting fact is that, that Site 53 exposed to view a few microlithis made on quartzite, a material used in the neolithic flake-tradition.

It is evident from the foregoing that the Middle Stone Age industry overlapped with the Late Stone Age at Nagarjunakonda. This, incidentally, provides the earlier limit possibly not in strict chronological sense, of the Late Stone Age tradition. The later limit is provided by the microlithic element of the Neolothic period, which, in all parallel-sided blades constituted the bulk of the microlithic assemblage of the Neolithic period. On the other hand, this type was never popular in the regular Stone Age sites except in Site 45-A. In Localities A, B and D they were virtually non-existent. Soundara Rajan, who discovered the industry in Locality A, has not reported the occurrence of parallel-sided blades there. It was, in the main, a non-geometric assemblage which included tool-types like backed blades, burings, awls, crude lunates, scrapers and almond-shaped points. The one found in Locality B, a site very close to the quartz reef *Tellarāllabodu*, did not yield any parallel-sided blades. Tools from this area show high percentage of retouched implements consisting of points scrapers, backed blades, burins, lunates triangles and trapezes made 'exclusively' on rock-crystal. But the most characteristic tool-type of the industry was asymmetrical point, either triangular or leaf-shaped, having provisions for tang or notch.

Site 53 revealed in its lowest deposit quite a high incidence of implements made of rock-crystal. There are reasons to believe that the technique of manufacture followed in respect of this particular type of stone bears comparison with that of Locality B where usually flakes have been taken out transversely from one of the crystal faces. The evolved phase of the neolithic culture was also dominated by tools made out of rock-crystal. Yet the technique employed for its manufacture was completely different from that of the industry of Site 53 and Locality B. In the neolithic sites, flakes, as a rule, had been taken out longitudinally from a platform prepared by the removal of one of the apexes. It was this technique which was responsible for giving rise to parallel-sided blades in the neolithic assemblage.

The Late Stone Age industry met with in Locality D, situated near a quartz outcrop, had no true blades. Made primarily on milky quartz, it was a non-geometric assemblage with tool-types like awls, scrapers, crude lunates and burins. However, the existence of a conical-shaped fluted core leaves no doubt as to the knowledge of making blades by the authors of this assemblage.

On the basis of what has been stated above we may perhaps infer that parallel-sided blades though had had their beginning even before the Late Stone Age, it became the

[1] K. D. Banerjee, 'Position of the Upper palaeolithic in the Stone Age of Southern Asia' *International Conference on Asian Archaeology, Summaries of Papers* (New Delhi), p. 23.

dominant tool-type only in the neolithic industry. From this point of view, the industry at Site 45-A appears to be a considerably late phase of the Late Stone Age, it may even be called proto-neolithic, strictly in terms of the microlithic facies in the Nagarjunakonda sequence. There is another aspect connected with the development of blades in different microlithic industries at Nagarjunakonda; the tendency towards gradual decrease in length. The following table will make the point clear :

Site No.	Period	Length-variation in mm.
53	Late Stone Age	20 to 50 mm.
45-A	Late Stone Age	15 to 50 mm.
45	Neolithic I	18 to 40·5 mm.
46-A	-do-	16 to 29 mm.
46	-do-	11 to 22.0 mm.

In contrast to the above, developments of lunates seem to have taken just in the opposite direction. The 'Short and broad' variety was the dominant type in the Late Stone Age industry the arc having been fully retouched. The 'Long' and narrow variety' was of frequent occurrence in the neolithic industry when the middle part of the arc had often been left unretouched likewise. But the evolved phase again shows arcs fully retouched. We can easily trace the development of backed blades, mostly retouched in the Late Stone Age industry. The frequency rose to the maximum during the first phase of neolithic culture, followed by a sudden fall in the succeeding phases. All this clearly separates the microlithic tradition of the Late Stone Age from that of the neolithic. At the same time, one cannot miss the fact that the later industry was the logical development of the earlier.

B. SITE 45-A

Site 45-A, in Sector SVI, situated in between the eastern bank of the perpetual nulla and the foot of the *Phirangimotu* hill, had a level of 382 ft. (116·88 m.) above M.S.L. and was about 8 ft. (2·44 m.) higher than the nulla bed (Pl. XIX). The general landscape of this area revealed a gentle slope towards the bed of an ancient canal, which was unearthed only 50 ft. (15·2 m.) to the east of the present site.

1. General Observations

The microlithic industry recovered in excavation was, in the main, a non-geometric assemblage of chert unassociated with pottery. Undoubtedly, it was a factory site where rejects and discarded specimens constituted the bulk. Blades do not follow a regular outline nor do they generally reveal any sign of utilization. Other tool-types comprise backed blades, lunates cresentic tool-types, arrow-heads, points and scrapers.

Inspite of the fact that they were recovered from definite stratigraphical context their absolute dating is difficult to work out. The industry appears to be pre neolithic in character as well as in sequence. The absence of pottery in layer 3 i.e., actual microlithic horizon, crudeness of artefacts, the presence of relatively longer blades and higher percentage of retouched tools tend to suggest a date anterior to the advent of neolithic economy in the valley. A good number of flake-blades also came from the same stratum. The layer superimposed on the actual microlithic deposit, yielded hetrogenous cultural material; comminuted pottery ranging in date from neolithic to historical period. This layer also exposed microliths and flake-blades, but one can hardly give any credence to the evidence gathered from this stratum, which seemed to have been composed only of drifted material.

The occurrence of quartzite flake-blades in this microlithic facies may be explained in two ways, namely, (i) that these tools were a necessary appendage to this industry, or (ii) that they represent earlier relics not associated with microlithic assemblage. Both the groups are so apparently dissimilar that it is difficult to accept them as different manifestations of one cultural trend. Nevertheless, it is worth while to record the following observations :

(i) The technique of snapping either end or both the ends of a blade is common to both.

(ii) The length and size of some of the quartzite blades or tools conform to those of microliths, wrought on stones other than quartzite.

(iii) Scraper with cresentic edge and thick back occurs in both the assemblages.

(iv) A microlithic cluster in Trench A_1 of division 378 of this site revealed five quartzite tools. Does it signify that these tools, although belonging to an earlier tradition, were being reused? However, the absence of waste flakes pertaining to this industry at this site evidently suggest that this was not the manufacturing centre of this quartzite flake-blades.

2. Description of cuttings

Altogether fifteen quadrants, each measuring 3m. × 3m. were sunk in this area. The natural disintegrated rock was found overlain by a thick deposit, about 2 ft. (61 cm.) in thickness, of whitish *kankary* layer, which was encountered in Trenches E_4 of 357 and B_5 if 358 at an average depth of 11″ (28·5 cm.) below surface; these were the westernmost and the easternmost trenches of this site. On the other hand, trenches dug in the middle of the site, viz., A_2 of 358 and A_1 of 378 exposed this *kankary* layer at an average depth of 1 ft. 6″ (46·5 cm.) below surface. The uppermost part of this deposit was comparatively loose, but below 2 ft. 6″ (76·8 cm.) it revealed better cohesion. This stratum appears to be a calcareous formation, also met with in other parts of the valley. The top few centimetres of this deposit occasionally yielded microliths, which might have been lodged inside the cavities of the loosely compact layer, otherwise it was devoid of any cultural equipments. Its superincumbent stratum, i.e., layer 3 was the actual microlithic horizon. No pottery came from this layer, which had a thickness varying between 2″ to 8″ (5 cm. to 20·5 cm.). It was composed of dark brown gravelly earth, blended with pellets of

whitish *kankar*, presumably derived from the preceding layer, and microliths were found concentrated at the bottom of the stratum. The top of the *kankary* deposit may, therefore, be taken as the cradle of a microlith-using people (Fig. 40).

In trenches E_8 of 357 and B_2 of 358 practically no intervening deposit was noticed between the microlith yielding layer and the top-soil, the latter had an average thickness of 5'' (12·8 cm.) in all the quardrants. Layer 2, with maximum thickness of 8'' (20·5 cm.) was composed of dark brown gravel, with specks of white *kankar* and roundish stone—only the central part of this site revealing this deposit. Layer 2 disclosed not only microliths but also rolled, comminuted pottery, similar in fabric to those from Site 45; even historical pottery might have got mixed up. This layer alone brought to light few pieces of animal bones. Layer 3 was, however, free from disturbances; microliths and flake-blades were in good state of preservation, though generally encrusted with whitish lime.

3. Microlithic industry

About 991 pieces including cores, waste flakes and quartzite flake-blades were recovered from this site and their distribution is as follows: microlithic tools 130 (13·12%), cores 162 (16·34%), waste flakes 629 (63·47%) and quartzite flake-tools 70 (7·06%). The predominant tool-type is blade, either retouched or unretouched, forming more than 60% of the implements, the majority of which were made either from chert pebble or nodule—the former giving rise to more waste-flakes than the latter (Fig. 39). In fact the finished products as recovered in the excavation generally included tools manufactured on black flinty chertor greenish chert.

(a) Cores and waste flakes

A detailed examination of cores and flakes throw some light on the technique of manufacture followed by the manufacturers of this industry. Quite a large number of waste-flakes show one side cortexed, though in length they appear to be the same as that of the original pebble or nodule; hence, they cannot possibly be considered as core-trimming flakes. There are, however, examples of cores wherefrom flakes had been taken out longitudinally from a single platform, but they are common more in layer 2 than in layer 3.

It is interesting to note that cores, waste-flakes and tools follow certain pattern in their distribution at this particular site. The north-eastern quadrant of Trench A_1, Division 378 exposed mostly waste-flakes, cores and discarded pebbles of chert but rarely any finished tools, whereas its north-western quadrant disclosed a cluster of well-faceted rock-crystals and quartz pieces. On the other hand, Trenches E_1 of division 377 and E_8 of Division 357 were replete with finished products on greenish chert. This variable distribution may tend to show, though vaguely, that working on different types of stones was undertaken at places, slightly apart from each other, presumably by different persons. Another interesting feature was the discovery of identical types, more or less, at the same depth in the same quadrant, e.g., five backed blades were found together from layer 3 in Trench E_1, Division 377.

The biggest cluster in Trench A_1 brought to light a few flakes which may be fitted together with the parent nodule or pebble. These reconstructed specimens as well as the

examination of some other cores and flakes off in slices without prior trimming of the cortexy surface; and microliths might have been made on such cases the preparation of an artificial platform was considered unnecessary. Where the pebble did not offer a flattish surface or where the weakness of the stone might not have been apparent an artificial striking platform had been brought about generally by flaking off a chip from the pebble. This technique certainly was not followed universally and this is quite obvious from the presence of fluted core in the present collection. Double platform cores had platforms which are at right angles to each other.

The following selected specimens of cores are illustrated (Pl. XXA)

1. A double platform core of pebble; a platform was prepared originally which two flakes, measuring 3·6 cm. × 1·3 cm. were removed, subsequently one of these flake-scars served as the second platform. From Sector NV/Div. 358-Tr.A_3, layer 3.

2. A reconstructed core; it broke into two halves due to mis-hit—the blow might have been directed on the point of weakness represented by a white vein running all round the nodule. From Sector NV/Div. 378-Tr.A_1, layer 3.

3. Two pieces of a pebble with cortexed surface; the original impact was insufficient to detach the intended flake which broke abruptly, subsequently the rest of the portion was removed. From the same locus as above.

4. Two pieces belonging to the same pebble, the detached flake looks like a slice, which might have been obtained by indirect percussion, no separate striking platform was made. From same locus as above.

5. Another reconstructed pebble—four flakes can be set together with the original core, no attempt was made to remove the cortex or prepare a striking platform. From same locus as above.

6. A single platform cylindrical core, flake-scars measure 3·5 cm. x 0·9 cm. From Sector NV/Div. 337-Tr.A_3, layer 2.

7. Pointed, based conical fluted core, or chalcedony, cortexed back and unfaceted platform. From Sector NV/Div. 358-Tr. A_3, layer 2.

8. Flat chisel-ended core, cortexed back, unfaceted platform. From Sector NV/Div. 378-Tr.A_1 layer 3.

(b) Classification of Microlithic tools

They may broadly be classified into five main types, e.g., blades, backed blades, lunates, points and scrapers.

BLADES : The majority of the blades are, more or less, parallel-sided without any secondary working. In these cases the median ridge is sometimes wavy and distal-end often snapped, the bulbous end being comparatively, narrower. Blades from this site range in length from 1·5 cm. to 5·0 cm. Unretouched blades from Bongara in Manbhum[1] and the Sanjai valley, near Chakradharpur in Singhbhum[2], may offer comparison with the blades of the present site. The Singhbhum blades vary in length between 2·2 cm. to 7·2 cm.,

[1] Gautam Sankar Ray, 'Microlithic Industry of Bongara, Manbhum", *Man in India*, 34, No. 1 (1954), p. 18.

[2] D. Sen & Uma Chaturvedi, "Microlithic Industry of Singhbhum", Man in India, 37, no. 4 (1957), p. 297.

whereas those from Bongara have lengths ranging from 1·7 cm. to 3·7 cm. The main raw material from both the sites used for fabricating microliths is chert or glassy variety of flint.

This assemblage includes some examples with both ends snapped, but it is difficult to find out whether they are merely by-products or a specific type of implement. Similar specimens are, however, reported from Birbhanpur[1]. Several other examples display one end snapped. It does not appear to be an accidental feature since one finds its parallel not only in the flake-blade tradition of this valley but also in the microlithic industries located at Giddalur[2] and Birbhanpur[3].

The following selected specimens are illustrated (Pl.—(XXB)

9. Irregualr in shape with a curved blade, broad and thick butt, latter having a finger rest. From Sector NV/Div. 378-Tr.A_1, Layer 3.

10. Broad knife blade of greyish quartzite, longitudinal flake-scars on dorsal surface, cortexed bulbous end. From same locus as above.

11. Roughly parallel-sided with distal end snapped and narrow bulbous end, medial ridge truncated near distal end. From Sector NV/Div. 337, Tr. E_1, layer 3.

12. Leaf-shaped blade with cortexed upper surface, notch at the butt end. From Sector NV/Div. 378-Tr.A_1, layer 2.

13. Parallel-sided blade with high but wavy medial ridge, narrow bulbous end, distal end snapped. From Sector NV/Div. 358 Tr.A_3, layer 3.

16. Roughly rectangular in shape with a thick broad butt, latter having a finger-rest, longitudinal flake-scars on upper surface. From Sector NV/Div. 378-Tr.A_1, layer 3.

17. Roughly parallel-sided with narrow bulbous end, wavy medial ridge, distal end wither broken or snapped. From Sector NV/Div. 358, Tr. A_3, layer 2.

20. Flake with both ends snapped and high medial ridge. From Sector NV/Div. 378-Tr. A_1, layer 3.

Backed blades : They are of two kinds, namely, blades with unretouched back and retouched back, the latter category being mostly crescentic in shape. Specimens with oblique back or one of its ends snapped are also available. The majority of the tools under this type show single primary flake surface.

Backed blades with unretouched back have little or no secondary working; some of them disclose incipient tang or notch at the butt-end. In this sub-type the cutting edge is rendered sharp by removing one or two flakes longitudinally, as a result thereof, the ridge

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[1] B. B. Lal, 'Birbhanpur, A Microlithic Site in the Damodar Valley, West Bengal,' *Ancient India*, No. 14, p. 22.

[2] K. V. Soundara Rajan, 'Stone Age Industries near Giddalur, District Kurnool,' *Ancient India*, No. 8, p. 89.

[3] B. B. Lal, *op. cit.* sub-type C ii.

is shifted to one side. Such untrimmed backed blades have a wide distribution and are noticed in the industries of Birbhanpur[1], Sanjai valley[2], Singrauli Basin[3], Giddalur[4], etc.

The crescentic variety has its back nicely retouched with arrangement for hafting, cutting edge being either straight or concave.

The following selected specimens are illustrated (Pl. XXB & XXIA & Fig. 53):

14. Cutting edge formed by removing a flake longitudinally, concave ventral surface, butt-end shows slight retouching, transverse flake-scars near butt-end. From Sector NV/Div. 378-Tr. A_1, layer 3.

15. Backed blade with incipient tang, bulbous end triangular in shape. From same locus as above.

18. Cutting edge made sharp by removing two flakes, notch at the thick butt-end. From same locus as above.

19. Crescentic in shape with back blunted by retouching bulbous end thick with an incipient tang, cutting edge bears use marks. From Sector NV/Div. 358-Tr. B_2, layer 3.

21. Leaf-shaped flake with an incipient tang, cortexed edge serving as back. From Sector NV/Div. 378-Tr. A_1, layer 2.

22. Oblique back blunted by retouching, snapped bulbous end, both the surfaces show single primary flake-surface. From Sector NV/Div. 378-Tr.A_1, layer 3.

23. Crescentic Backed blade, retouched back, one of its end flattish possibly to facilitate an easy grip or hafting. From Sector NV/Div. 357-Tr. E_2, layer 3.

33. Semi-crescentic backed blade, back blunted by retouching, one of its ends snapped, cutting-edge formed by removing a flake longitudinally, flake-scars at butt-end. From Sector NV/Div. 378-Tr.A_1, layer 3.

LUNATES: All the specimens have arc blunted by retouching but cutting edge is either straight or crescentic, both the types being reported from the Sanjai valley[5] and Birbhanpur[6]. The majority of the specimens display single primary surface and a few of them seem to have a some sort of tang.

The following selected specimens are illustrated (Pl. XXIA Fig. 53).

28. Lunate with back blunted by retouching, also possesses an incipient tang, crescentic cutting edge. From Sector NV/Div. 358-Tr. B_1, layer 2.

29. Lunate with blunted back and crescentic cutting edge, end portion broken. From Sector NV/Div. 378-Tr. A_1, layer 3.

30. Lunate with blunted back and straight cord. From Sector NV/Div. 358-Tr. A_2, layer 2.

31. Same as above. From the same locus.

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[1] B.B. Lal, *op. cit.* p. 22, fig.7, No. 5.

[2] D. Sen and Uma Chaturvedi, *op. cit.* p. 298.

[3] V.D. Krishnaswami and K.V. Soundara Rajan, 'The Lithic Tool-industries of the Singrauli Basin' *Ancient India*. No. 7, p. 60.

[4] K.V.Soundara Rajan, *op. cit.*, p. 90.

[5] D. Sen & Uma Chaturvedi, *op. cit.* p. 297.

[6] B. B. Lal, *op. cit.*, fig. 8.

POINT : This tool-type forms an appreciable number in this assemblage and divisible into five sub-types, e.g., unworked leaf-shaped, worked from both the margins, crescentic point, worked from one margin but other side obliquely snapped, pointed end obtained by chipping. All these sub-types conform mainly to two shapes, triangular and leaf-shaped. The method of obtaining pointed end by giving vertical strokes on either side by holding the blades horizontally is noticed at Singhbhum[1]. Some sort of an incipient tang is provided in majority of the examples, which might have been used as arrow-heads.

The following selected specimens are illustrated (Pl. XXIA & B & Fig. 53).

24. Pointed end of this rock-crystal specimen achieved by chipping both the margins, a notch at the butt-end. From Sector NV/Div. 378-Tr. A_1, layer 2.

25. Leaf-shaped with incipient tang obtained by secondary working, possibly an arrow-head. From Sector NV/Div. 358-Tr. A_6, layer 3.

26. It looks like a triangle with incipient tang, both the margins retouched, the third side is formed by snapping the upper part obliquely. From Sector NV/Div. 337-Tr. E_2, layer 3.

27. Crescentic point, one margin fully retouched, other margin shows slight working near the pointed end, has also an incipient tang. From Sector NV/Div. 358-Tr. A_2, layer 2.

32. Triangular shaped point, one of the margins retouched other side snapped. From Sector NV/Div. 357-Tr. E_2, layer 3.

34. Leaf-shaped point with working from both the margins, transverse flake-scars near butt-end, made thin and narrow. From Sector NV/Div. 357-Tr. E_2, layer 3.

41. A crooked point obtained by snapping the upper part obliquely, butt-end carved towards concave ventral surface, longitudinal flake-scars on dorsal surface, longer margin shows wear and tear, but not possibly due to use: slight retouching near the pointed tip of the longer margin, shorter margin bears retouching, possibly used as borer. From Sector NV/Div. 377-Tr. E_1, layer 3.

SCRAPERS : Scrapers generally made on flakes, form a good percentage at this site. A few specimens show more than one working-edge; generally they are rectangular in outline. No. 36 has almost a cleaver-like end though one of its margin reveals minute retouching as well. Cleaver like edge is formed by the abrupt convergence of dorsal surface with ventral surface, the resultant edge is made still thinner by minute chipping. This type appears to be similar to No. 43 of the flake-blade industry; similarly the scraper with crescentic working edge of the microlithic series No. 37 is also comparable with No. 48 of the quartzite group.

The following selected specimens are illustrated (Pl. XXIB & Fig. 53).

35. Concave scraper, thick butt-end, undersurface also concave. From Sector NV/Div. 358, Tr. A_4, layer 3.

36. Scraper with double working edge, reduced butt, top and right hand margins retouched. From Sector NV/Div. 377-Tr. E_1, layer 3.

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[1]D. Sen & Uma Chaturvedi, *op. cit.* p. 298.

37. Scraper with double working edge, thick butt, left hand margin retouched, top-margin also shows chipping. From Sector NV/Div. 358 Tr. A_2, layer 3.

38. Scraper with thick back, crescenting working edge shows retouching, it has a pointed end and thick butt, longitudinal flake-scars on upper surface. From Sector NV/Div. 378 Tr. A_1, layer 3.

39. All the four sides blunted by retouching, it has a medial ridge too. From same locus as above.

40. It shows retouching on all the three sides, butt-end provided with a beautiful finger-rest. From Sector NV/Div. 358 Tr. A_2, layer 3.

4. Quartzite flake-blade industry

It has been called flake-blade industry because the dominant tool-type of this facies is flake-blades, which may, however, include scrapers on blade of various sizes and shapes. All the seventy specimens, distributed in both the strata, are in excellent state of preservation, though heavily encrusted with lime. So far as shape is concerned, they are either more-or-less parallel-sided or leaf-shaped, both the varieties showing high medial ridges, sometimes one of the ends truncated and very often with reduced butt. They were possibly used either as blade scraper or arrow-head. There is one massive cleaver like implement, the occurrence of which at this site is rather inexplicable.

The following selected specimens are illustrated (Pl. XXIIA & Fig. 42).

42. An elongated leaf-shaped flake-blade, about 11 cm. in length and 5·2 in breadth, lengthy flake-scars on dorsal surface result in a high medial ridge, edges show secondary working, it has a reduced butt, primary flake-surface on the under surface, plain right-angled striking platform. From Sector NV/Div. 358-Tr. A_2, layer 3.

43. A thick rectangular tool with a high medial ridge near the bulbous end, oblique cleaver like edge formed by the abrupt intersection of a flake-scar on the dorsal surface with the ventral primary flake surface; this as well as the left hand margin show trimming, measures 7·6 cm. length. From Sector NV/Div. 358 Tr. A_2, layer 2.

44. An ovoid flake with suppressed bulb of percussion; trimming along the margins, medial ridge abruptly truncated making one end thinner and butt-end thick, another broad flake has been removed from right hand corner of the thick butt, length 11·1 cm., maximum width 5·2 cm., possibly used as scraper. From Sector NV/Div. 378-Tr. A_1, layer 3.

45. A flake-blade with a medial ridge, both ends snapped obliquely, sign of utilization on the left hand margin, measures 4·0 cm. in length. From Sector NV/Div. 378-Tr. A_5, layer 3.

46. A leaf-shaped point, about 5·7 cm. in length and 2·7 cm. in width, crooked pointed end, high medial ridge and retouched edges, possibly used as arrow-head. From Sector NV/Div. 358-Tr. A_2, layer 3.

47. A thin-sectioned flake, with faceted right-angled platform and reduced butt, measures 4·5 cm. x 3·5 cm. From the same locus as above.

48. A thick flake measuring 7·2 cm x 4·5 cm. with thick back, crescentic scraping edge nicely trimmed, bears transverse flake-scars on dorsal surface, part of which retains its cortex; but intentionally reduced, used possibly as a scraper. From Sector NV/Div. 378-Tr. A_1, layer 2.

49. A flake-blade with curved body, snapped ends and trimmed edges, longitudinal flake-scars on

convex upper surface, medial ridge truncated at one end, possibly a scraper or blade, measures 5·4 cm. in length. From the same locus as above.

50. Almost parallel-sided blade with retouched edges and prominent medial ridge, top obliquely snapped, measures 4·9 cm. in length. From Sector NV/Div. 358-Tr. A_3, layer 3.

51. A flake with wavy mid-rib, facted platform, sign of use-marks all along the trimmed edges, possibly a blade-scraper, measures 5·4 cm. x 4·2 cm. From the same locus as above.

52. (Pl. XXII B): A heavy tool measuring 19·2 cm x 13·6 cm. with cortexed and humped dorsal surface, the cleaver-edge formed by the intersection of the chipped ventral surface with cortexed dorsal surface; three sides show not only flakings but also use-marks; From Sector NV/Div. 358, Tr. A_3, layer 3.

C. SITE 53[1]

Situated on the eastern bank of the perpetual nullah, Site 53 (Pl. XXIII A & B), falling in Sector S XVII is girdled on all the three sides by granite outcrops; rising to a height of about 10 ft. (3·05 mts.) from the present ground level of the site proper (435' or 132·53 mts. from M.S.L.); even in the area to the south and south-west where the natural surface shows a gentle slope towards the nullah bank are present a number of outcrops. Thus, the site is practically a closed area—perhaps a natural trough measuring 100 feet in length and 80 feet in breadth (30·47 mts. x 24·39 mts.). The ground level towards the east and north-east is almost flushed with the flattish top of the outcrops; the natural disintegrated rock in this part, generally of a tufaceous character, was met only 3'' (7·62 cm.) below the surface. This elevated ground varying in levels between 440' (134·05 mts.) and 445' (138·62 mts.) from M.S.L. yielded from the surface quite a large number of tools belonging to flake-blade-scraper complex, the early palaeolithic tools or microliths being rarely noticed. On the other hand, the surface of the site under discussion, though contiguous to the latter area, was prolific in the yield of microliths. It was, no doubt, an ideal site, may be a factory site—the rock surface serving as a natural anvil, the rivulet supplying the perennial stream of water and the Eddanamotu hill, situated within a distance of 1000 feet (304·80 mts.) providing the main source of raw-material, barring, of course, the river-worn pebbles.

1. General observations

The industry encountered at this site is definitely dominated by crescentic points and lunates. The lowest cultural deposit, in fact, shows a high frequency of backed blades of various shapes and sizes. Lunates too form an appreciable quantity and exhibit quite a good number of sub-types. In the neolithic deposits long and narrow type of lunates are generally met with, whereas the lowest stratum of this site is marked by the presence of both 'long and narrow' and 'broad and shorter' varieties; those with primary flake-surface on both the sides form also a fairly good percentage. The most preponderant type, next to backed blades, is the point, which in the majority of the cases was utilized as arrow-head both retouched and unretouched types are available but latter more common on the upper

[1] Based partially on the Report submitted by Sri M.V.N. Krishna Rao, Technical Assistant, who actually excavated the site during the period of his stay at Nagarjunakonda.

strata. The occurrence of triangles in this assemblage is certain and trapezes might have had their use as well. Thus, it must be admitted that the geometric element at this site is quite pronounced. Truly speaking, unretouched blades constitute very negligible proportion and the real conical shaped fluted core is absent in the lowest layer.

Flake-blades have been found in all the layers though their concentration is more in the lowest deposit, overlying the natural disintegrated rock. These flake-blades, mostly unretouched are similar to those recovered at Site 128 and from Locality A. Quite a good number of scrapers on flake also came to view. The occurrence of flake-blades in this deposit is again difficult to explain: either these are older relics unassociated with the microlithic industry or an accompaniment of microlithic culture of the present site. Tools of flake-blade-scraper complex, also known as Series II, which had their concentration at the adjoining high ground, are represented by only two clear specimens.

Microliths have been fashioned here on greyish quartzite or sandstone, a material which had never been used for preparing tiny tools at any other site of Nagarjunakonda. It is worth noting that the incidence of occurrence of rock crystal was comparatively high in the lowest deposit and there are also reasons to believe that the technique of manufacture followed in respect of this stone bears comparison with that of Locality B where usually flakes have been taken out transversely from one of the crystal facets. But it is an industry dependent mainly on chert or green jespery chert. Pebbley chert had a higher frequency in the upper layers, specially in layer 1 (Pl. XXIV A).

It may appear from the foregoing that the assemblage laid bare in stratum 3, does not reveal much intermingling. Layers 1 and 2, however, present heterogeneous elements but there is definite preponderance of tools having close affinity with the neolithic industry of this valley. The greater frequency of tools and waste flakes of chert pebbles, the use of parallel sided blades with one of its margins retouched, the presence of true conical shaped fluted cores and concomitant blades, the absence of broad and short variety of lunates, obliquely blunted backed blades, and the occurrence of lunates with middle part of the arc unretouched may tend to suggest a distinct characteristic of this assemblage, which, however, might have got mixed up with the earlier as well as later materials; sherds resembling the *Ikshvaku* pottery, even stone beads and copper finger rings have been recovered in layer 1 as well as in layer 2. Let it be mentioned here that layer 1 yielded far greater quantity of microliths than layers 2 and 3 but 2A representing possibly an ancient humous did not reveal many tools.

2. Description of cuttings

With a view to have the cross-section of this site a long trench measuring 103' (31·39 mts.) x 5' (1·52 mts.) was laid in east-west orientation; a series of small trenches, though in regular alignment were also sunk in north-south direction to find out the longitudinal profile of the area[1]. It is apparent from these sections that it was originally an undulated

[1] A total number of twenty-one trenches (each measuring 20' x 5') were dug—Trenches A_2, B_3 and D_3 in Div. 252, Trenches A_3, A_4, A_5 and B_2 in Div. 250, Trenches E_4 and E_5 in Div. 249 Trenches E_3 and D_3 in Div. 251, Trenches A_1 and B_1 in Div. 290 Trenches C_3, C_4, D_3, E_3 in Div. 269 and Trench E_2 of Div. 263.

trough-like area, full of granite outcrops and boulders. The excavation was carried out to a maximum depth of 3' 4" (1·01 mts.) inspite of the fact that weathered rock could be met at a depth varying between 2 ft. (0·61 mt.) and 3ft. (0·91 mt.) below surface; over the outcrop the deposit was not more than 5" (12·7 cm) in thickness. The weathered rock formation was devoid of any cultural materials, notwithstanding the occurrence of few microliths and flake-blades from the upper part of the stratum which might have got deposited inside it through cavities and fissures. This fact lends support to the contention that the top of this weathered rock was the habitat of a microlith using people, layer 3, composed of red gravel mixed with small and medium sized angular stones might have contained somewhat unmixed occupational débris of this group of people. This layer 3 having a maximum thickness of 1' (·31 mt.) was overlaid by layer 2A, composed of dark brown earth mixed with fine gravel; greyish patches throughout this layer may be due to the disintegration of botanical substances. In some places deposits of subangular stones formed a distinct layer over the natural and close observation showed that tools are generally found over this deposit; probably this deposit antedates the microlithic industry of this site. It is also significant to note that this layer did not yield much in terms of tools—possibly it was an ancient humus over which the later microlith using people might have had their settlement and layer 2, composed of reddish brown earth with uniform distribution of very fine gravel containing the vestiges of their cultural remains. In view of the occurrence of large number of microliths in layer 1 and also from the surface it appears that the top soil might have been scoured off as a result of erosional activities or prolonged dry crop cultivation. But the tools are in excellent state of preservation though stained red.

3. Microlithic industry

Microlithic industry from this valley may be classified under eight heads (i) cores and and flakes, (ii) unretouched blades, (iii) retouched backed blades, (iv) points and arrowheads, (v) lunates, (vi) other geometric shapes, (vii) burin-like tools and (viii) scrapers.

Cores and flakes: It has already been stated that tools and waste flakes of chert-pebbles were more profuse in the upper-most stratum where conical shaped fluted cores with regular longitudinal flake-scars struck from one platform constituted a fairly good number. Fluted cores did occur in the lowest deposit but they are of irregular outline, and further, flake-scars are somewhat broader in these cases—there are at least two tortoise shaped cores as well—thereby suggesting comparatively a greater antiquity of the industry encountered in stratum 3. Cores of greyish quartzite and waste flakes arising out of the preparation of quartzite flake-blades were also recovered from the lowest stratum. Core rejuvenation flakes and reutilized cores also came from this site but obviously they had had their concentration in the upper layers.

The following selected specimens are illustrated (Pl. XXIV B & Fig. 43).

1. A rejuvination flake of sand stone with longitudinal flake-scars struck from one platform. From Div. 249/Tr. E_2, layer 3.

2. Double platform core on chert pebble, platforms at a right angle to each other. From Div. 249/Tr. E_2, layer 2.

3. Double platform core of chert, platforms opposite to each other. From Div. 250/Tr. C_2, layer 2.

4. Fragment of a tortoise core on chert, flake-scars on all sides of the central platform. From Div. 249/Tr. E_2, layer 3.

5. Pointed-base-fluted core on pebbly chert, cortexed back. From Div. 270/Tr. B_2, layer 2.

9. Chert core with longitudinal flake-scars struck from one platform. From Div. 250/Tr. A_2, layer 3.

11. Same as above. From Div. 270/Tr. B_2, layer 3.

Unretouched Blades: The frequency of unretouched blades is considerably low at this site in the lower deposit—upper layers did expose tools similar to those of the neolithic types, which are entirely absent in layer 3. Some of the un-retouched ones have some sort of back but the most important fact is the occurrence of sand stone and quartzite blades though majority of such tools are made on chert and next comes rock-crystal. Longer irregular-shaped blades are confined to lower strata and comparable to those from Site 45-A. Blades from this site vary in length from 2·0 cm. to 5·0 cm.

The following selected specimens are illustrated (Pl. XXIV C).

14. Almost parallel-sided blade, with high medial ridge truncated near the broader bulbous end, use marks on either margin, length 4·9 cm. From Div. 250/T. B_2, layer 2.

15. Almost parallel-sided blade though distal end narrower than the bulbous end, high medial ridge use marks on left hand margin, length 3·2 cm. From Div. 269/Tr. C_2, layer 1.

16. Blade with unretouched back and with crescentic cutting edge, length 3·1 cm. From Div. 270/Tr. A_2, layer 3.

17. Quartzite blade with constricted bulbous end, truncated medial ridge, distal end snapped or broken, slightly, concave ventral surface, length 4·3 cm. From Div. 250/Tr. A_4, layer 3.

18. Fragment of a parallel-sided blade of sand stone. From Div. 270/Tr. A_1, layer 3.

19. Blade with double-ridged dorsal surface and slightly concave undersurface distal end snapped, length 2·7 cm. From Div. 270/Tr. A_2, layer 2.

20. Blade with narrowing distal end, medial ridge struck off, concave ventral surface, length 2·7 cm. From Div. 269/Tr. E_4, layer 2.

21. Parallel sided blade, length 2·6 cm. From Div. 269/Tr. E_4, layer 2.

22. Blade of rock-crystal, broader bulbous end had slight projection possibly for hafting, left hand margin unworked, yet blunt longitudinal flake-scars on the upper surface, length 204 cm. From Div. 270/Tr. B_2, layer 3.

23. Irregular shaped blade with serrated right hand margin, wavy medial ridge, distal end obliquely snapped, other end made narrower possibly for hafting, length 5·5 cm. From Div. 250/Tr. A_4 layer 3.

24. A carnelian bladelet, more or less parallel sided, intact medial ridge, transverse flake-scars on upper surface, concave ventral surface, length 2·0 cm. From Div. 269/Tr. E_4,l ayer 2.

25. Almost parallel sided with truncated medial ridge, narrow bulbous end, other end snapped or broken, length 2·6 cm. From Div. 270/Tr. B_2, layer 3.

26. Backed blade of rock-crystal, serrated cutting edge. longitudinal flake-scars on upper surface, ventral surface concave, other end snapped, length 2·0 cm. From Div. 269/Tr. E_4, layer 2.

27. Backed blade—back formed by shifting the ridge towards right hand margin, which is cortexed, the edge shows usemarks, flake detached near thick bulbous end to facilitate hafting length 4·2 cm. From Div. 270/Tr. B_2, layer 2.

RETOUCHED BACKED BLADES: There is definitely a preponderance of backed blades of various shaped and sizes at this site—they were more common in the lower deposit where parallel sided blade with one margin blunted by retouching is entirely absent. Obliquely blunted backed blade, oblique portion being only retouched, came only from layer 3. They show either single flake-surface on both the sides or the cutting edge is brought about by removing a flake longitudinally on the dorsal surface. Thus, the backed blade from this site may be divided into three sub-types, viz., (i) blades with oblique back either fully retouched or partially retouched, (ii) semi-crescentic backed blade and (iii) parallel sided backed blade, confined to only upper layers. Backed blade of sand stone is also noticed in this assemblage.

The following selected specimens are illustrated (Pl. XXV A & Fig. 44).

28. Roughly triangular in shape with narrow and thin bulbous end, distal end quite thick, back fully retouched, cutting edge formed by removing a flake longitudinally on the upper surface as a result a ridge is formed, ventral surface lightly curved and shows primary flake surface, bears use-marks on the cutting edge. From Div. 249/Tr. E_5, layer 3.

29. Blade with oblique retouched back, oblique part thicker than the rest, longitudinal flake-scars on the upper surface. From Div. 270/Tr. A_2, layer 3.

30. Crescentic backed blade with tapering end, back fully retouched. From Div. 269/Tr. D_3, layer 2.

31. Semi-crescentic backed blade, with thick butt-end, fully retouched back, cutting edge formed by removing a flake longitudinally. From Div. 269/Tr. D_3, layer 3.

32. Crescentic backed blade of whitish sand stone, back fully retouched, primary flake surface on both the sides. From Divn. 250/Tr. A_5, layer 3.

33. Backed blade of agate, roughly triangular in shape, thicker bulbous end, back fully retouched, cutting edge formed by removing a flake longitudinally on the upper surface, concave undersurface. From Div. 250/Tr. A_2, layer 3.

34. Tanged crescentic backed blade of rock-crystal, back including the tang fully retouched, longitudinal flake-scars on the dorsal surface. From Div. 270/Tr. A_1, layer 3.

35. Crescentic backed blade with incipient tang, back fully retouched, cutting edge formed by removing a flake longitudinally on the dorsal surface. From Div. 269/Tr. E_3, layer 1.

36. Back fully retouched, bulbous end snapped, provision for hafting at the butt-end, longitudinal flake-scars on the dorsal surface, cutting edge bears use-marks. From Div. 270/Tr. A_1, layer 2.

37. Blade with oblique back only retouched, cutting edge formed by removing a flake longitudinally on the dorsal surface. From Div. 269/Tr. E_4, layer 3.

38. Backed blade of quartzite, roughly triangular in shape, thick bulbous end, back fully retouched, slightly concave cutting edge, primary flake-scars on both the sides. From Div. 250/Tr. A_4, layer 3.

39. Parallel-sided blade with one of its margins retouched. From Div. 269/Tr. D_3, layer 2.

40. Tanged crescentic blade, back excluding the tang retouched, concave ventral surface, cutting edge formed by removing a flake longitudinally. From Div. 250/Tr. A_4, layer 3.

41. Backed blade with crooked pointed end, latter slightly broken, bulbous end snapped, longitudinal flake scars on the dorsal surface. From Div. 269/Tr. E_3, layer 2.

42. Back fully retouched, bulbous end snapped cutting edge formed by removing a flake longitudinally. From Div. 269/Tr. E_3, layer 1.

43. Crescentic backed blade with an incipient tang, cutting edge formed by removing a flake longitudinally. From Div. 270/Tr. A_1, layer 3.

44. Blade with oblique back fully retouched, concave ventral surface. From Div. 269/Tr. E_3, layer 1.

LUNATES: Lunates from this site have their arcs invariably blunted by retouching and the cutting edge is either straight or slightly concave. They have either 'long and narrow' or 'short and broad' outline—the cutting edge of the latter variety is brought about by removing a flake longitudinally but in case of the former they show either primary flake-surface on both the sides or the cutting edge is formed by detaching, a flake longitudinally. 'Broad and short' are confined mainly to the lower deposit where the other sub-type is totally absent. Lunates from the lowest stratum have their arcs fully blunted but those from upper levels display in good many examples unretouched middle portion of the back. There is one example in which both the axes are of equal length—this was possibly used as transverse arrow head. Lunates made of sand stone or quartzite also occur in this assemblage.

The following selected specimens are illustrated (Pl. XXV A & Fig. 44).

45. Long and narrow variety, arc blunted by retouching straight cord obtained by removing a flake longitudinally, as a result a high ridge is formed on the upper surface. From Div. 250/Tr. A_4, layer 3.

46. Short and broad variety, arc completely blunted by retouching, undersurface slightly convex, cutting edge formed by removing a flake longitudinally. From Div. 250/A_6, layer 2A.

47. Long and narrow variety arc fully blunted, concave cutting edge, primary flake surface on both the sides. From Div. 250/Tr. A_4, layer 3.

48. Long and narrow variety of lunate on agate, arc fully retouched, use-marks on chord. From Div. 250/Tr. A_2, layer 2.

50. Long and narrow variety of lunate on quartzite, primary flake-surface on both the surfaces, arc fully blunted, cutting edge slightly convex. From Div. 250/Tr. D_3, layer 2A.

52. Long and narrow variety, middle portion of the arc unretouched, cutting edge formed by removing a flake longitudinally, chord bears use-marks. From Div. 269/Tr. E_3, layer 2.

53. Long and narrow variety, mild retouching on the arc, primary flake-surface on both the sides, lower part of the upper surface has been made thinner. From Div. 290/Tr. A_1, layer 2.

54. Arc fully retouched, incipient tang and slight depression at the lower and possibly used as transverse arrow-head. From Div. 270/Tr. A_8, layer 3.

56. Short and broad variety of lunate on chalcedony, arc completely blunted by retouching, chord made sharp by removing a flake longitudinally. From Div. 270/A_1, layer 3.

57. Long and narrow variety with slightly splayed out ends, chord made sharp by removing a flake longitudinally, use-marks on the chord. From Div. 270/Tr. B_8, layer 3.

59. Long and narrow variety of lunate on rock-crystal, straight chord obtained by removing a flake longitudinally, arc fully retouched, use-marks on chord. From Div. 270/Tr. A_4, layer 2A.

60. Short and broad variety of lunate on rock-crystal, ends slightly splayed out, slightly concave ventral surface, cutting edge formed by removing a flake longitudinally on the dorsal surface. From Div. 250/Tr. A_8, layer 3.

OTHER GEOMETRIC SHAPES: Besides lunates, there are few triangles and trapezes in this assemblage. The triangles have their cutting edge brought about by removing a flake longitudinally, thus the difference between triangles and the lunates lies in the shape only and possibly not in function. The obtuse-angled back of the triangles are fully retouched. Trapezes from this site are not so clear examples as triangles and they differ from the lunates only in having a humped back.

The following selected specimens are illustrated (Pl. XXV A & Fig. 44).

49. Trapeze with a triangular cross-section, slightly concave ventral surface, cutting formed by removing a flake longitudinally. From Div. 250/Tr. B_8, layer 2.

51. Triangle, back fully retouched, cutting edge formed by the removal of a flake longitudinally on the upper surface. From Div. 263/Tr. C_8, layer 2.

55. Triangle with high medial ridge formed as a result of the removal of a flake longitudinally. From Div. 270/Tr. A_8, layer 3.

58. Trapeze on rock-crystal, cutting edge formed by removing a flake longitudinally. From Div. 250/Tr. A_2, layer 2.

POINTS AND ARROW-HEADS: Like backed blades points also are in considerable bulk at this site. These points seem to have been used mostly as arrow-heads. The majority of them are retouched either from one margin or from both the margins, but unretouched ones also do not form a little percentage. In fact unretouched leaf-shaped points or arrow-heads of this site are very similar to those picked up from the surface of Locality E. There is one variety of points from this site in which pointed end was obtained by snapping the distal end obliquely, followed by retouching—in such examples point was shifted generally to the left hand margin. Points of quartzite have also come to light from this site. So far as shape is concerned this type of implements may be divided into four sub-types, viz., (a) leaf-shaped, (b) crescentic or semi-crescentic, (c) triangular, and (d) points with square cross-section. The leaf-shaped variety has generally a plano-convex or triangular cross-section whereas crescentic and triangular shaped points show usually triangular cross-section. Many of the specimens have incipient tang or provision for hafting and lashing.

The following selected specimens are illustrated (Pl. XXV B).

61. Leaf-shaped, without secondary working, plano-convex transverse section, thicker bulbous end, longitudinal flake-scars on dorsal surface, slightly concave undersurface. From Div. 270/Tr. A_1, layer 2A.

62. Triangular in shape with a roughly triangular cross-section, slightly crooked pointed end, one of its margin being retouched, ridge shifted to the left hand margin. From Div. 263/Tr. E_3, layer 3.

63. Triangular in shape with a triangular cross-secrtion high medial ridge, without any secondary working, flake-scars at the butt-end for easy hafting. From Div. 269/Tr. E_3, layer 2.

64. Leaf-shaped with incipient tang, triangular cross-section, high medial ridge, without any secondary working. From Div. 269/Tr. E_4, layer 1.

65. Leaf-shaped with plano-convex cross-section, worked all along the margin from both sides, a deep flake-scar at the bulbous end is meant to facilitate hafting. From Div. 269/Tr. E_3, layer 3.

66. Crescentic point of quartzite with incipient tang, roughly triangular cross-section, primary flake-surface on both the sides. From Div. 257/Tr. D_2, layer 2.

67. Narrow semi-crescentic point, top left hand margin retouched, roughly triangular cross-section, butt-end is made thinner by removing flakes longitudinally. From Div. 269/Tr. E_4, layer 3.

68. Semi-crescentic point with thick proximal end and slight protruberance, ventral surface curved near the thicker end, pointed end achieved by retouching from one margin and the chipping from the other, left hand margin fully retouched, triangular cross-section. From Div. 269/Tr. E_3, layer 2.

69. Crescentic point, retouched from one margin, triangular cross-section, butt-end made thinner. From Div. 250/Tr. A_4, layer 3.

70. Point with one margin retouched, a deep flake-scar on the snapped bulbous end meant for facile hafting. From Div. 270/Tr. A_1, layer 2.

71. Leaf-shaped point, retouched on top right hand margin, triangular cross-section, thick bulbous end. From Div. 250/Tr. A_4, layer 2A.

72. Crescentic point on carnelian, retouched fully on both the margins, longitudinal flake-scars on dorsal surface, concave ventral surface. From Div. 270/Tr. B_3, layer 2A.

73. Semi-crescentic, pointed end obtained by retouching from left hand margin and by removing a flake longitudinally from the other margin. From Div. 269/Tr. D_4, layer 1.

74. Pointed end achieved by retouching from one side by removing a flake longitudinally from the other margin, concave ventral surface, slight protruberance at the proximal-end and flake-scar at the butt-end meant to facilitate hafting. From same locus as above.

75. Pointed end obtained by retouching from one margin and by detaching a flake longitudinally from the other, the oblique back fully retouched. From Div. 269/Tr. E_3, layer 2A.

76. Crescentic point, triangular cross-section. From Div. 270/Tr. D_2, layer 3.

77. Unretouched point of agate, triangular in shape, roughly triangular cross-section, snapped bulbous end, longitudinal flake-scars on the dorsal surface, a deep flake-scar at the butt-end. From Div. 250/Tr. A_4, layer 2.

78. Tanged unretouched point. From Div. 269/Tr. E_3, layer 1.

79. Point on rock-crystal, retouched from both the margins. From Div. 270/Tr. A_1, layer 3.

80. Point on rock-crystal, one of its margins retouched triangular cross-section. From Div. 252/Tr. A_2, layer 2.

81. Tanged crescentic point, one of its margins retouched, similar type came from Site 46. From Div. 270/Tr. A_2 layer 1.

82. A point on chalcedony with one margin retouched. From Div. 250/Tr. A_4, layer 1.

83. A small semi-crescentic point on carnelian retouched from one margin. From Div. 269/Tr. C_2, layer 2.

84. Pointed end achieved by snapping the distal end obliquely, followed by retouching, which extends even on the right hand margin, V-shaped bulbous end possibly for hafting. From Div. 270/Tr. A_2, layer 1.

85. Same as above, but on agate. From Div. 252/Tr. C_2, layer 1.

86. A semi-crescentic point on rock-crystal, top left end relatively thicker, bottom retouched. From Div. 269/Tr. E_4, layer 3.

BURIN: There are few tools with burin-like facets confined mainly to upper deposits. It is difficult to ascertain their actual horizon; no such tools occur in any of the neolithic sites at Nagarjunakonda. The purpose of these tools is also not easy to determine.

The following selected specimens are illustrated (Pl. XXIVB & XXVB).

10. Two oblique spalls, opposite to each other, but these hits have not truncated the margins, slightly concave under-surface, dorsal surface shows high medial ridge. From Div. 249/Tr. C_2, layer 1.

88. Oblique spall opposite to a vertical spall, which has truncated the margin, other margin shows retouching. From Div. 270/Tr. A_1, layer 2.

SCRAPERS: Scrapers do not form a bulk in this site and more over they were made generally on flakes. Cores re-utilized as scrapers are common in the upper deposits rather than in the lower strata.

The following selected specimens are illustrated (Pl. XXIVB).

6. Side-cum-concave-scraper on flake, right hand and bottom margins retouched, one side of the dorsal surface cortexed, from Div. 250/Tr. A_4, layer 3.

7. Side scraper on reutilized core, right hand margin retouched, longitudinal flake-scars on the upper surface. From Div. 270/Tr. A_1, layer 2.

8. Thumb-nail scraper with all the margins except butt-end retouched, truncated medial ridge, concave ventral surface. From Div. 270/A_2, layer 1.

12. Scraper on flake, fully retouched margins, wavy medial ridge, thick butt-end, concave ventral surface. From Div. 269/Tr. D_2, layer 3.

13. Side-cum-concave scraper on flake, retouched all along the margins except near butt-end, a deep flake-scar on the right side of the butt-end, for easy grip, longitudinal flake-scars on the upper surface. From Div. 290/Tr. B_1, layer 3.

Flake-blades: Flake-blades came to light from all the layers of this site but their concentration seemed to have been more in the natural disintegrated rock. This industry was dependent more on quartzite and the excavation brought to light cores and waste flakes associated with it; a comparatively higher frequency of scrapers is readily recognizable. Its position vis-a-vis microlithic assemblage has already been discussed. Suffice it here to say that this flake-blade industry is very similar to the one uncovered at Site 128.

The following selected specimens are illustrated (Pl. XXVI A & B) & (Fig. 45).

91. Unretouched flake-blades with tapering end, snapped bulbous end, wavy medial ridge. From Div. 250/Tr. A_4, layer 3.

92. A flake of greyish quartzite, with longitudinal flake-scars on the upper surface. From Div. 250/Tr. A_3, layer 2.

93. Disc-scraper on greyish quartzite. From Div. 250/Tr. D_3, layer 3.

94. Unretouched flake-blade, with both ends snapped, wavy medial ridge, left hand side cortexed, left hand margin worn out. From Div. 250/Tr. A_4, layer 3.

95. Flake-blade with a well-defined butt, longitudinal flake-scars on the upper surface, and slightly rounded top. From Div. 290/Tr. B_1, layer 1.

96. A crescentic blade on doleritic trap, arc blunted. From Div. 250/Tr. B_3, layer 2.

97. A side-scraper on greyish quartzite. From Div. 270/Tr. A_2, layer 3.

98. Unretouched flake-blade; slightly concave ventral surface, wavy medial ridge. From Div. 269/Tr. E_2, layer 3.

99. Scraper on quartzite with nice secondary working, possibly belongs to an earlier flake-blade-scraper complex. From Div, 250/Tr. D_4, layer 3.

100. Side-scraper on flake, well defined butt-end, longitudinal flake-scars on the upper surface, retouching along the margin. Locus same as above.

101. Tanged end-scraper with high but wavy medial ridge. From Div. 250/Tr. D_4, layer 3.

102. End-cum-side scraper, retouching along the edges. From Div. 249/Tr. E_4, layer 3.

103. Unretouched flake-blade of quartzite, one of its margins worn out. From Div. 269/Tr. E_4, layer 3.

D. MICROLITHS FROM SURFACE

Microliths had been picked up from every part of the valley but there were certain localities where they occurred in greater number or in clusters. The detailed survey of the valley brought to light the following localities:

Locality A: Area to the east and north of the *Ashtabhujasvamin* Temple, Site 29, falling in Sector N XXIV.

Locality B: High ground falling in Sectors S. IV and S. V.

Locality C: Area to the west and south of Site 9 falling in Sector S. IV.

Locality D: On the hillock near the river bank in sector S.II.

Locality E: Foot of the *Eddanamotu* hill from Sectors S. XIII to S. XVII.

Each of these localities was dependent mainly on a particular type of raw-material, for example, Locality B yielded tools fashioned exclusively out of well-faceted crystal, whereas the main raw-material in Locality D was quartz.

I. Locality A

Microliths from this locality, situated on the bank of the Krishna are mostly on agate, jasper and chert. River pebbles brought down from Dharwar formations served as the main source of supply of raw-materials. Several clusters of pebbles, mostly of agate, carnelian, chalcedony and chert were found distributed over a wide area, varying between 320' (97·5 mts.) to 340' (103·6 mts.) from the Mean Sea Level. Microliths were picked up by the writer mostly from or near these clusters of silicious pebbles. They were practically small pebble beds, sometimes having a thickness of about one foot (·31 mt.). Excavations in this area clearly revealed that these pebble deposits had been resting practically on the topmost formation of land so far as this particular locality was concerned.

This microlithic assemblage is non-geometric in character dominated by backed blades, burins, awls, crude lunates, scrapers and almond-shaped points. Since this industry has already been described[1], no description of tools is given here.

II. Locality B

This area, varying in levels between 400' (121·9 mts.) to 420' (127·9 mts.) from Mean Sea Level, yielded mainly an industry, on rock-crystal, occasionally a few quartz specimens were also discovered. The area is practically a flat ground with outcrops few and far between. A quartz-reef, now practically flushed with the ground level, is seen on the north-western fringe of this locality—this reef seems to have an east-west orientation running parallel to the other one, locally known as *Tellarallabodu.*

The mature neolithic phase, as the excavation disclosed, was also associated with a microlithic industry on crystal, and the area wherefrom this surface collection had been made was well within the ambit of the neolithic zone of the valley. But the present collection does not show much typological affinity with the neolithic industry of Nagarjunakonda. Majority of the tools are broken but surprisingly they show high percentage of retouched implements. Surface collection, no doubt, is governed by some amount of fortuitous element but typological dissimilarity, despite the use of same raw-material is so conspicuous, that it is not possible to assume these two industries as manifestations of one particular cultural element. It does not, however, necessarily mean chronological hiatus between the two groups, but there is no stratigraphical evidence to prove or disprove their contemporaneity since trenches laid in this area exposed a thin mantle of superficial deposit covering the disintegrated rock. Nonetheless, typologically, as it will be evident from the following discussion, the present industry is reminiscent of an older tradition.

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[1] K. V. Soundara Rajan, 'Studies in the Stone Age of Nagarjunakonda and its Neighbourhood', Ancient India, No. 14, pp. 90—93.

Microliths from this locality is made on large-sized crystals and there are sufficient grounds to say that flakes have been taken out transversely using one of the crystal facets as the striking platform. This feature, as already stated, is not noticed in the neolithic industry where flakes, as a rule, are taken out longitudinally from a prepared platform. This difference in technique is a dominant feature of both the groups, namely, the predominance of blades in the neolithic facies and the absence of real parallel sided blade in the other. Some of the tools and short-blade core collected from this locality may be compared with those from the neolithic site, but this is probably due to subsequent occupation of the area by the neolithic people. Thus, the available data on hand will justify the differentiation of this tradition with that of the neolithic industry; it is also most likely that these two distinct elements were not co-eval with each other.

This earlier assemblage of this locality is dominated by points, scrapers and backed blades—a few geometric forms like lunate, trapeze and triangle also occur and if the latter trend represents a geometric tradition it is without any doubt very feeble. There is one tool with burin-like facet as well. But the most characteristic tool-type seems to be the group of implements identified as points, which vary considerably in shape as well as in size. Mostly they are asymmetrical but conform mainly to two sub-types, e.g., triangular and leaf-shaped, either with tang or notch, suggestive of their use as arrow-heads. The triangular shaped points have their analogies in the Jalanhalli industry, Mysore. The rarity of real long blades predominance of points and scrapers are points of similarity of this assemblage with the latter, but there is a substantial difference also, because triangles and lunates do not form any appreciable quantity in the present industry.

While the presence of trapezoids here may be taken as almost a certainty, the triangles are of doubtful character. Both the types of backed blades, retouched and unretouched, are found from this locality—one of the backed blades has one of its end also retouched, may be for its use as scraper as well. Tools with double-working edge are noticed not only at Site 45A but also in the Bandarwala industry in Ceylon, where also the main raw-material is rock-crystal.

The following selected specimens are illustrated (Pl. XXVIIA).

1. A thick blade with a sharp cutting edge and thick back, latter retaining the original prismatic surface, bulb unaffected, dorsal surface except near the bulbous end, shows longitudinal flake-scars, distal end retouched, a flake taken out transversely for providing the tool a finger rest for facile hafting.

2. Side cum-hollow scraper, dorsal surface and the sides bearing the original prismatic surface.

3. A side-scraper on flake, having a thick butt-end and concave under surface.

4. A thumb-nail scraper provided with finger rest, upper margin nicely retouched.

5. Side-scraper with high ridge and thick butt, latter retains the original prismatic surface, transverse flake-scars on both sides of the ridge.

6. Triangular shaped point with two sides retouched the longer axis showing the retouching near the pointed top third or the axis near the butt also retouched, a broad flake detached near the bulbous end, either for hafting or used as finger-rest.

7. A tanged point of roughly trapezoidal in shape, all the margins show retouching, medial ridge truncated, transverse flake-scars on the upper surface.

8. A crude triangle with original dorsal surface.

9. Same as No. 7, right hand side retains prismatic surface, thick butt-end and concave ventral surface.

10. Triangular shaped scraper with all the margins retouched, concave under surface, wavy medial ridge, half of the upper surface retains original prismatic surface.

11. Fragment of a blade with back blunted by retouching use-marks on the cutting edge brought by removing a flake longitudinally.

12. Trapezoidal blade with back retouched, tang-like projection, use-marks on the cutting edge.

13. Same as above, but small-sized.

14. Same as above.

15. A crude lunate with arc blunted by retouching.

16. Blade with oblique back unretouched, constricted lower half meant for easy hafting.

17. Burin (?), one oblique spall opposite to two longitudinal spalls.

18. Leaf-shaped point, retouched all around.

19. Crescentic point with upper margins retouched, slightly crooked point, concave under-surface, possibly of neolithic facies.

20. Backed blade, crescentic back retouched, use marks on other margin.

21. Point with all the margins retouched, concave under surface.

22. Point, retouched from both the margins.

23. Point with tang-like projection, retouched all along.

24. Hollow-based point with crooked tip, retouched all around the margin.

III. Locality C

This locality is situated south and south-west of Site 9 and to the north of the Megalithic cluster in Sector S. IV. It has a rugged surface with boulders and outcrops jutting out here and there. Levels of this locality vary between 380' (115·9 mts.) to 400' (121·9 mts.) from Mean Sea Level—tools were generally discovered from the vicinity of granite outcrops.

Microliths from this area do not belong to one facies. Tools of chert, rock-crystal, quartz, carnelian, chalcedony, etc., were found together with bigger quartzite flake-blades. This intermingling makes it impossible to find out any individual character of this collection. Trenches laid in this area proved absolutely barren and furthermore, many of the specimens were actually picked from bare rock surface.

The following specimens are illustrated (Pl. XXVIIB).

1. Unretouched leaf-shaped blade of carnelian, bulbous end cortexed, longitudinal flake-scars on upper surface, concave dorsal surface.

2. Unretouched blade of chert with pointed distal end, wavy medial ridge.

3. Unretouched backed blade of chert.

4. Scraper of quartz with retouched margin.

5. Unretouched point on chert, wavy medial ridge.

6. Tanged point on chert, slightly retouched from the left hand margin.

7. A crescentic backed blade on chert.

8. Possibly an unfinished lunate on chert, arc retouched, chord unworked.

9. Lunate with arc blunted by retouching, longitudinal flake scar on the ventral surface.

(Pl. XXVIIIA).

1. Highly patinated chert flake with one end obliquely snapped, possibly used as a scraper.

2. Flake of a quartzite with one end obliquely scraped.

3. Quartzite flake, borken into two halves.

4. Point-cum-scraper on chert, retouched on the margins of the lower half.

5. Scraper on chert, left hand and top margin retouched.

6. Disc scraper on quartzite.

7. Unretouched leaf-shaped flake.

IV. Locality D

This area is noted for flake-blades as well as microliths on quartz. The site is situated on the summit of a small hillock; the topmost part of which lies 385′ (117·3 mts.) from M.S.L., whereas the surrounding plane has a contour of 360′ (109·9 mts.) from Mean Sea Level. Tools were collected from the area varying in levels from 370′ (112·9 mts.) to 380′ (115·9 mts.), and since they were picked up from a restricted area, close to a quartz out-crop, the possibility of their being far removed from the context is little. But again, a problem arises as to the real horizon of the flake-blades which occurred in large numbers within the same limited area.

The major part of the summit is a bare rock-covered by a superficial deposit. A trench, 10′ (3 mts.) × 5′ (1·5 mts.) was however laid near the quartz-outcrop where an accumulation of superficial deposit appeared to be comparatively thicker than that of the other areas. Microliths were found in this trench only to a maximum depth of 8″ (20·3 cm.) below surface—the maximum number of 17 flakes of various material like quartz, rock-crystal, chert and chalcedony came from a depth of 4″ (10·2 cm.) below surface but none of these pieces can be considered as tool. Moreover, no quartzite flake-blade came to light.

The natural disintegrated rock was exposed at a depth varying between 6" (15·2 cm.) to 8" (20·3 cm.) below surface. Thus, like other parts of the valley the stratigraphy failed to suggest a clue in deciding the relationship of flake-blades with microliths, and also the latter's actual horizon.

In the collection of flake-blades, some of them being highly patinated, are found tools made on materials other than quartzite, the latter, however, is the dominant raw-material for the industry characterised by tools like blades, blade-scraper, point etc.

This is the only locality where quartz formed the primary raw-material for manufacturing microliths belonging to non-geometric shapes. True blade is entirely absent but the existence of a conical-shaped core with longitudinal flake-scars, struck from one platform, and flake-scars on an awl-like implement leave no doubt as to its currency amongst this people. In this assemblage there is, nevertheless, a definite preponderance of awls and scrapers, besides a few crude lunates and burins. So far as illustrated specimens are concerned, save No. 9, all are made of quartz.

The following selected specimens of microliths are illustrated (Pl. XXVIIIB).

1. Smallest example of disc-scraper from this area, retouched all round.

2. Discoid scraper, retouched all round except near butt where flake removed possibly to provide a finger-rest.

3. Pointed based and conical shaped core wherefrom blades taken out longitudinally from single, plain platform.

4. Discoid scraper, differs from other similar specimens in having a tang-like projection serving possibly as a finger-rest.

5. Pointed end, probably serving as a borer, was obtained by retouching from both the sides, retouching near butt-end also—lower half possibly serving as the scraping edge.

6. A croocked point, achieved by snapping obliquely the distal end, top left, bears retouching; two longitudinal flake-scars on the dorsal surface.

7. Lunate with arc retouched, but does not show any sharp edge, thick chord projection at the bottom noticeable.

8. Burin on rock-crystal with two oblique spalls.

9. Burin with two oblique spalls, constricted lower half also retouched, meant for facile hold.

10. A scraper on flake, used possibly as side-cum-concave.

The following specimens of flake-blades are illustrated (Pl. XXIX).

11. Roughly rectangular chert flake with retouched edges, high wavy medial ridge, flake removed near the bulbous end meant for easy grip, possibly a scraper on blade.

12. Parallel-sided flake on quartzite, both the margins retouched, plain, right-angled platform, constricted bulbous end, the other end snapped or borken, high medial ridge, possibly scraper on blade.

13. Parallel-sided flake with worn out edges, right-angled striking platform, narrow bulbous end, other broken or snapped, truncated medial ridge, possibly scraper on blade.

14. Roughly leaf-shaped flake on chert with right-hand margin retouched, two ribs on the upper surface, under surface slightly concave, possibly a scraper on flake.

15. Quartzite flake with three edges retouched, used possibly as scraper.

16. A crescentic scraper on chert, tool highly patinated, arc retouched, thick chord and lower half bearing cortex.

17. A beautiful specimen of scraper on cherty quartzite, used as end-cum-side-cum-hollow scraper, all the three sides retouched, longitudinal flake-scars on the humped dorsal surface, a deep flake-scar near the bulbous end and tang-like projection meant for easy grip.

18. Long leaf-shaped point on quartzite with arrangement for hafting, patinated, high medial ridge.

19. Broad leaf shaped point with retouched edges, deeply patinated.

V. Locality E

Microliths were picked up all along the foot of the Eddanamotu hill which is a long stretch of land about a mile in extent. Microliths are made mostly on chert and there is definitely a high frequency of leaf-shaped points or arrow-heads. Trenches laid in this long stretch of land did not expose any tools except from one place, i.e., Site 53, which yielded tools made either on chert pebbles or chert nodules. But the surface collection is exclusively composed of microliths fashioned out of different varieties of chert nodule, and further, they were generally found concentrated around granite out-crops, a characteristic feature also met with in other areas. Thus, each cluster may represent a small factory which grew in proximity to the sources of raw-material, flattish granite outcrop serving as a natural anvil-rock. Flake-blades were not of very common occurrence in this locality. As the industry represented by the surface-finds, is similar to that laid bare at Site 53, the description of the selected specimens is not given here.

IX. NEOLITHIC AGE

A. INTRODUCTION

THE INFLUENCE OF GEOGRAPHICAL FACTORS LIKE THE PROXIMITY OF SOURCES OF WATER, either the river or rivulets and the easy accessibility of stone out-crops providing the raw material, largely determined the location of neolithic settlements at Nagarjunakonda. The tool yielding areas may roughly be classed under two localities viz., Locality X and Locality Y. More than a sizable section of the settlements clustered around the former of these which was apparently the converging centre of neolithic activity in the valley.

A limited strip of land of 3350 m. in length and around 1120 m. in width covers both the localities, bounded by a rivulet flowing along south to south-west in the eastern side while the western side was bordered by the perenniel river Krishna, running from south to north. The principal neolithic settlement flourished near the rivulet while Locality Y is near the banks of the river.

This long strip of land was naturally equipped with the raw material required for fashioning the tools. The southern region of this longitudinal strip lay over the high-level ground, practically covering the highest land surface of the valley. Boulders of granite and out-crops of stone were few and far between here. In sharp contrast, the northern portion lying over comparatively lower levels contains out-crops of boulders and hillocks. The neolithic folk instinctively had favourable inclinations towards establishing their settlements in this region.

Sites 46, 46-A, and 47 between the levels 398′ to 400′ M.S.L. (121·26 m. to 121·87 m.) comprising the Locality X (Fig. 46) were more or less circumscribed by a series of outcrops, over-lying the southern slopes of a trap-dolerite ridge (425′ to 445′ M.S.L. i.e., 129·51 m. to 135·61 m.), part of which was named in the *Ikshvaku* inscription as *Chuladammagiri*. This dyke traversed the valley along a north-south line, while yet another vein mostly underground, was discernible in the northern half of the *Ikshvaku* citadel which was referred as Locality-Y here. A few more dykes intruding into granite beds were observed in this strip. Besides, the juxtaposition of two parallel veins of white quartz in this narrow stretch of land, more or less outlines the geological set-up of this location. *Tellarāllabodu* or the white-stone-hill was the most conspicuous reef of quartz where matted prismatic crystals were found.

Despite the disadvantage of its brittleness, crystal rock was the favourite stone to work with for the neolithic man of this valley. The principal quartz reef lay about 365 m. away towards the north west of locality X. This table ground was found strewn all over with microliths of rock crystal[1] and sizable numbers of basalt flakes, sporadic occurrences of

[1] Microliths from this area belonged to two different traditions. Neolithic facies was represented by short unretouched blades. But the collection, specially from the high ground, revealed a high percentage of retouched tools which did not occur in pits or strata of different neolithic dates. Perhaps it was a distinct tradition not connected with the neolithic facies.

which were noticed beyond *Stupa* No. 9 in Section S. IV. Fragments of crystal rock were rarely found in the other parts of this valley.

Microliths of rock crystal apparently had a coextensive distribution along with the spread of the neolothic zone of Nagarjunakonda. But neoliths were found confined within two clear-cut localities. Tools came in large numbers from Locality X, roughly within a small area of 2 acres (0·81 hector), while Locality Y's yield was limited to a half a dozen only, almost from the area around the *Peddakundellagutta* hill. Site 68, the neolithic cemetery was exposed at a distance of 560 m. towards south of this region. Though indications of a neolithic habitation were not available in Locality-Y, it may not conclusively rule out the existence of a possible settlement here. In all probability, the subsequent structural activity followed by intensive cultivation had obliterated all traces of evidence in this regard.

Sites 46, 46-A and 47 formed a cluster owing to their close proximity. This area was about 70' (20·33 m.) higher over the level of the river bed and 9 m. away from the sand dunes of the rivulet mentioned earlier, on the bank of which Site 45 was situated (Pl. XXXA). This site represented the dawn of Neolithic culture at Nagarjunakonda; with its level at 386' M.S.L. (117·6 m.), it was only 17' (5·28 m.) above the bed of the *nulla* and was around 160 m. to the east of the principal neolithic settlement. This locality was comparatively free from boulders and stone outcrops. The people of this site unlike their successors appear to have preferred level ground, to a rugged landscape infested with boulders and rocky outcrops.

B. SUMMARY OF THE RESULTS

In the absence of any stratigraphical sequence or super-imposition of cultural strata, one has to depend on circumstantial evidence for determining the duration and the sequence of neolithic cultures of Nagarjunakonda. On the basis of detailed analysis and comparative studies of cultural materials, it is possible to define a few distinct characteristics of each site, which are summarised below:

1. Summary

Site 45: It represents the advent of neolithic culture in the valley of Nagarjunakonda. Pottery comprises of bowls, urns and possible vases, of pale reddish brown hand-made ware. Mostly unslipped, this crude pottery shows invariably thick gritty blackish section with a a plethora of sand particles in its texture. The total absence of grey ware is the most conspicuous feature of this assemblage; there is, however, one sherd of black slipped ware. Despite its crude fabric, the shapes of pale reddish brown ware are very similar to those of neolithic or chalcolithic affiliation. Incised band is the only decoration noticed in cases of a few sherds: one or two pieces show lime-coating also.

This pottery is associated with an essentially short-blade microlithic industry, mostly in chert. It is a non-geometric assemblage dominated by blades, backed-blades both retouched and unretouched-points, lunates and scrapers.

But this neolithic facies is characterised by the rarity of neoliths and those that occur too, are very crudely fabricated celts which have chipped-pointed-butt and elliptical cross-section. The only adze having a plano-convex transverse section has a similarly fashioned pointed-butt. Flakes of basalt and quartzite occurred in this assemblage also.

Animal bones were rarely met with. Excavation did not disclose any pottery-disc or disc-circular bead, although stone balls, dabbers and pebbles with battered ends etc., came to light.

SITE 46-A: This site s also noted for the paucity of neolithic tools. On the basis of pottery, pits of this site may be divided into two groups; namely (i) red ware predominated pits and (ii) grey ware predominated pits.

(i) This group of pits (Pits 1, 1B, 1C, 1D, 2, 3, 4, 4A, 5, 6 & 7) yielded overwhelming number of redware sherds, mostly hand made. Pottery, similar to that of last-mentioned site was also discovered in limited number but the quantum of sand particles in this type is less than that of site 45. Slips of better type of red ware, vary from pinkish buff cream to orange red, as the firing was never uniform and a large number of sherds reveal pink exterior and blackish interior. Broad types are only three or four in the red ware; one or two types are available in the black slipped and grey ware also. Spout in grey ware occurs for the first time in this phase but there is no doubt that grey ware here played a subordinate role. There is a fragment which appears to be that of a double-pot.

Flakes or flake-blades of basalt and greyish quartzite were unearthed from this group of pits which did not, however, yield any neolith. The use of chert microliths continued, though rock-crystal became the favourite material for their manufacture. Pottery disc, rarely disc-circular beads, and various types of miscellaneous stone objects were recovered. The occurrence of fragments of bones of the ox, buffalo, goat, sheep, pig etc., may throw light on the food habits of this people. In this phase people probably lived in underground dwellings, as suggested by the presence of a number of pits, some of which were associated even with post holes.

(ii) The second group (Pits 1A, 8, 8A, 9, 10, 11 & 12) produced comparatively higher percentage of dull grey, or burnished grey ware, quartzite flakes and disc-circular beads of paste. All neoliths found at this site were discovered near this group. The only pit that furnished a neolith was Pit 8. No microlith, however, came from this group. Pale brown reddish ware was entirely absent.

These pits, as a whole, did not yield much of cultural accumulations like animal bones, pot-sherds, flakes etc., which may denote a short occupation. Layers of this site were practically bereft of occupational vestiges. Further, the majority of pits of this group were blocked with stones and boulders. Pit 8 laid bare the skeleton of an adult male underneath a cairn heap. The skeleton was placed in the pit over an accumulation of 28 cm. thickness. People, who were responsible for the digging of this group, might have been a migratory population, who left the place after the death of one of their inmates or kinsman.

SITE 47: Pits from this site may also be divided into two groups on the basis of frequency factors of red ware and grey ware. Deposits in strata, contemporary to neolithic pits, could be traced here, but generally they were confined to areas very close to pits.

(i) Pits 7, 7A, 7B, 9, 9A, 9B form a cluster and a few others like Pit 3 etc., contained comparatively greater quantity of red ware. Unslipped red ware, very similar to pale

reddish brown pottery comparable to that of Site 46A, was also noticed. Grey ware formed a negligible fraction. Microliths, mostly on chert, came from this group of pits. As a matter of fact, only one or two pits outside this group yielded microliths in addition to two neoliths, both from Pit 9A and a disc bead from Pit 3. People, possibly, preferred to live in underground shelters. The profusion of animal bones suggests the existence of large herds of animals, probably domesticated. These pits yielded good quantities of charred bones, indicative of the essentially flesh eating habit of this people. Pottery types, viewed broadly, comprise vases, urns, bowls, basins and jars. The continuity of chert microliths, scarcity of neoliths or disc-circular beads, smaller numbers of broad pottery-types and the survival of unslipped red ware provide a connecting link of this group of pits with that of Site 46-A.

(ii) The other group, represented by the majority, exposed grey ware in higher percentage along with lesser quantity of red ware types, the total number of main types being quite high; black slipped ware was also present in appreciable quantity. Needless, to say, unslipped red ware was of rare occurrence in this group. Both long as well as short spout was in vogue. Upper stratum of cemetery produced long spouts, which were not met with in the earlier layer. Besides spouts, main types from this group of pits constitute vases, urns, bowls, dishes, cups (?) *lota* type of pottery, basins, narrow-mouthed jars, lids and a channeled lipped bowl. An increase in the number of main types seems to be a significant factor of this assemblage and this may imply a developed stage of material culture, which is attributable to a phase posterior to the tradition preserved in the red ware-dominated pits of Site 46A.

It is interesting to note that flakes of greyish quartzite hitherto of secondary provenance had out-numbered the basaltic ones in these grey ware dominated pits. Neolithic tools from pits and strata showed higher frequency but implements of tillage operations, like shoe-last celt, weeding hoe, elongated celts etc., however, did not come from this site at all. Animal bones, again, were in plenty. Fragmentary bones of infants were lodged in urns buried near habitational area. These pits generally exhumed big sized discular beads ranging in diameter between 9 mm. to 14 mm. As a matter of fact, Pit 5 disclosed 3 out of a total number of 5 beads, picked up from the site. Pit-dwelling continued. But the occurrence of abandoned pits, indicated by packings with stones and boulders, may signify desertion by the group responsible for digging them.

Site 46: This is considered to be the most developed neolithic phase of Nagarjunakonda (Pl. XXXB). Tools, flakes and pottery were dug out in greater abundance in the layers, co-eval with the pits. The use of grey ware had assumed great frequency and the number of types also recorded an increase. This does not mean the absence of red ware, which continued side by side. There were also pits in this site where red ware occurred in higher percentage. The number of burnished sherds and black slipped pottery registered a definite rise. Broadly speaking, the main types comprised vase, bowl, urn, dish, lid, lid-cum-dish, basin jar, plate, *lota* type of pottery, cup, perforated pottery bowls with splayed out lip, square based straight sided miniature pot, spouts and miniature spouted vessels. Types like miniature spouted vessel, perforated pottery, square based pot, plate and lid-cum-dish, did not appear at other sites of Nagarjunakonda. Occasionally, nicely and

uniformly fired sherds of red ware also found. Sherds with ochre-wash came from this site also. The quantity of unburnished grey ware is definitely more in the Northern Extension area of this site. Thus, on the basis of pottery it is possible to define three groups, viz., area showing predominance of (i) unburnished grey ware, (ii) red ware and (iii) burnished grey ware along with red ware of better fabric. The last mentioned group does not evidently preclude the presence of unburnished variety.

Neolithic industry of the site also unravels an evolved stage. The assemblage includes both carpenter's tools as well as artefacts for tillage operations. Microliths of quartz-crystal superceded those of chert. The number of unretouched specimens marks an increase. Similarly basalt flakes made room for greyish quartzite flakes or flake-blades. Disc-circular beads in this site are either of paste, steatite or shell. Working on bone or horn is evidenced in one small rim-fragment of a miniature pot, made of horn. Above all, two minute bits of copper came to light from this site only. Hence, it is certain that technologically this site was in an advanced stage of development, albeit, in comparison to other sites of the valley. Miscellaneous stone objects like querns, pestles, stone-balls, hammerstones, etc., had also been recovered. Pottery disc, the execution of which is of a superior order also made its appearance.

Dwelling consisted either underground or semi-subterranean shelters, besides houses, built over a frame of stout earth-fast posts, supporting walls and roofs. The last category, again, shows an advancement in the art of constructing shelters. Fragmentary bones of infants were buried in urns near the dwellings. The existence of closed pits may affirm that it was not wholly a permanent settlement.

Site 68: It was the cemetery of the neolithic people inhabiting the valley. Skeletal remains were distributed in two strata, thereby indicating a time-interval between the two sets of burials. The lower group of burials followed extended inhumation mode of disposal of the dead, accompanied by grey ware pots. The upper stratum disclosed two different modes of disposal, namely (i) extended inhumation and (ii) post-excarnation burial. The later burials were also associated with grey ware pots. The long spouts occurred only in this stratum. The exclusive use of grey ware in both the layers of the cemetery does not mean that the people represented there had been using only grey ware. May be that grey ware rather than red ware was used more for ritualistic purposes. The relics of Site 46-A herald the arrival of the people using grey ware in restricted quantity. Possibly these people were responsible for the early group of burials. The upper stratum may be attributed to the people living either in Site 47 with grey ware dominated pits or to Site 46.

2. Determination of phases

Three phases, if not more, are clearly discernible in the neolithic culture of Nagarjunakonda. Site 45 may easily claim the honour of being the earliest neolithic settlement by virtue of the preponderence of chert microliths, crudely fabricated neoliths, inferior types of red ware pottery and the absence of grey ware.

Site 46-A proclaims the arrival of a new people who knew the use of grey ware, though in limited quantity. The presence of unslipped red ware in certain pits of Sites

46-A and 47 may be taken as another ground, for considering the authors of this assemblage as the successors of site 45 culture. The restricted number of main types, the rarity of disc-circular beads and neoliths, are indications in favour of dating these pits anterior to those of grey ware dominated groups.

That neolithic culture of Nagarjunakonda had two more phases, besides the earliest one, may be deduced from the stratigraphy of the cemetery. The third phase perhaps coincides with its upper stratum. Pits with relatively higher incidence of grey ware sherds of Sites 46 and 47 might have been the habitational remains of the people of the third or the most evolved phase of Nagarjunakonda. In this period people used better types of tools, variety in pottery, beads, quartzite flake-tools and other artefacts. The construction of shelters also marked a definite step forward.

It may appear that the culture represented in Site 47 was less developed than that of Site 46, where also the existence of three groups are definable. These may be only variation in the levels of culture, which may not have any chronological bearing. People here might not have been fully sedentary. Different groups belonging to different modes of human evolutions came into this valley and made their existence felt in course of time. That is why, even if it is possible to differentiate various groups, attempt has not been made to arrange them in sequential order, lest it might give a wrong picture of the neolithic pattern of this valley. But the existence of three phases seems to be more than probable, though the concept of continuous occupation may prove incorrect so far as the testimony of Nagarjunakonda is concerned.

Phase I (Site 45) revealed crude hand made pale reddhish brown pottery, short blade microlithic industry on chert, crudely fabricated neoliths, use of basalt and quartzite flakes, scarcity of animal bones, total absence of disc-circular bead, pottery disc and grey ware.

Phase II (Site 46-A-Pits 1, 1B, 1C, 1D, 2, 3, 4, 5, 6 & 7; Site 47—Pits 4, 10, 11, 12, 16, 17 & 18) revealed mainly redware pottery; restricted quantity of unslipped red ware of previous period and presence of grey ware as the subordinate group, chert and quartz-crystal microliths, scarcity of neoliths, disc-circular beads, slightly higher percentage of greyish quartzite flakes, large quantity of animal bones, restricted number of pottery types, dwelling in pits and prevalance of extended inhumation.

Phase III (Sites 46 & 47) showed predominance of grey ware over red ware, neolithic tools of various types, quartz-crystal microliths, greyish quartzite flakes, disc-circular beads of paste, steatite and shell, working on bone or horn; dwelling in square or rectangular houses as well as in pits, large number of pottery types, occurrence of dish, lid-cum-dish lipped bowl, square based miniature pot, perforated pottery etc., besides possibly, handles, ochre-washed sherds, urn burials for infants, adults and children buried in cemetery in extended positions and post-excarnation burials were also in vogue side by side.

C. PATTERN OF NEOLITHIC CULTURE AT NAGARJUNAKONDA

Cultivation, stock-breeding and the use of pottery are the three distinguishing traits of a neolithic society. It means greater control of man over his food-supply and his

endeavour to produce food and supplement the supply bestowed by Nature. This is none the less, an ideal condition and evolution of human society seldom follows a straight path. Naturally one can expect various neolithic cultures in different stages of development. A clear-cut demarcation between them is rather hypothetical.

It is therefore, difficult to ascertain whether the neolithic pattern at Nagarjunakonda satisfies all the necessary prerequisites of an ideal neolithic economy or culture. Pottery, no doubt, was known even to the earliest neolithic settlers of this valley. The total absence of wheel-turned pottery in this phase may be an indication of the primitive nature of this culture. They had possibly the rudimentary knowledge of cultivation since the tools found from Site 45 comprised generally impliments of tillage operations. From the scarcity of animal bones one may also infer that they did not know the art of domestication of animals. Evidence similar to that of Utnur[1] is also not met with.

That hunting did not play a notable role in the augmentation of their food-supply may be assumed from the predominence of blades and lunates in the associated microlithic industry. The percentage of point or arrow-head in this assemblage is not more than five of the total. It is most likely that the tiny tools of this phase might have had their use in the realm of food-production rather than in the food-gathering stage.

Pottery discovered at this site bears some resemblance with that from Laughnaj in Gujarat, Baidyapur in Mayurbhanj District, Orissa, Panchmari, Madhya Pradesh and a few other sites. But it should be remembered that these shapes are analogous to later neolithic ware of Nagarjunakonda and other places. It is perhaps not an unwarranted hypothesis that the shapes of this crude handmade pale reddish brown pottery, may be once widespread, may have determined the shapes of red ware, dull and burnished grey ware etc. of later epochs.

The short-blade microlithic tradition seems similar to Sanganakallu I.[2] Like the later, a flake tradition also survived in this period. Notwithstanding the dissimilarity of these two flake-traditions from the point of view of technology, both the assemblages had, very likely, a similar functional usage. The occurrence of a few neoliths and less pottery may suggest a slightly evolved phase than Sanganakallu I. In fact, Phase I of Nagarjunakonda fills up the gap between cultures comparable to Sanganakallu I and Sanganakallu II. There are reasons to believe that the short blade tradition is anteriror in date in this part to long-blade tradition, arising out of the crested guided ridge technique. The later tradition is completely absent in any of the phases at Nagarjunakonda. Once the persistence of flake-tradition in neolithic economy is recognised the evolution of neoliths from a flake industry as a reaction to environmental conditions is hardly difficult to work out. Quite a good number of neoliths are made on flakes at different sites of India. It does not necessarily mean that core-tradition did not influence the neolithic tool-types at all. Foote's collection includes even flakes with polished edge. So, one need not look outside the Deccan or Karnatak to find

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[1] F. R. Allchin, *Utnur Excavations* (1961 p. 54).

[2] B. Subba Rao, Perhistoric and Early Historic Cultures of Bellary (1949).

out the place of origin of the neolithic industry, that flourished in this region. It might have evolved quite independently. The evidence of Phase I of Nagarjunakonda may point to the fact that after the short blade microlith-cum-flake tradition, possibly, came a stage in the Deccan and Karnatak when neolithic tools were used in a restricted way. Once a trait is borrowed such conditions are not likely to prevail.

Neoliths are rare in Phase II of Nagarjunakonda also. It may be a culmination of Phase I culture but the possibility or reinforcement from outside need not, however, be ruled out. The evolution of red ware, so common at various neolithic or chalcolithic sites of the Deccan and Karnatak, from its cruder unslipped forerunner might have taken place outside the valley. This was a period when the population was by no means stationary. Some sort of nomadism was inherent in the early neolithic economy. The closed pits of Sites 46, 46A and 47 must be taken as a sign of desertion, otherwise the practice of filling up of pits with stones and boulders is hardly explainable. The skeleton of Pit 8 of Site 46-A was placed in the pit when the deposit inside had accumulated to a certain height. A cairn-heap was also raised over the dead. The most interesting point is stone-filling in all the nearby pits. Practically, each one of them disclosed a discular bead. That some ritual might have taken place on the eve of the movement of a particular group may be envisaged from relics of Pits 28 & 54 of Site 36 also. In the former, two neoliths along with a miniature spouted vessel were intentionally kept side by side. Similarly, burying of the animal skeleton accompanied by intact pots presupposes observance of certain rites just before the departure of a particular group. Thus when different groups are frequently moving from one place to another the development may not take place at one and the same site. It is, therefore, reasonable to assume that people belonging to Phase II arrived at the scene at a subsequent period.

It was they who brought in their train grey ware, disc beads and also possibly the knowledge of domestication of animals. In this period animal bones occurred in plenty. The presence of large quantity of bones of the ox, buffalo, goat, sheep etc. would perhaps mean that the inhabitants maintained large herds. The enormous quantity of animal bones, mostly in pieces and sometimes even charred, may well throw light on their food-habits. One may now easily visualize here a picture of a pastoral people, who might have left their cultural debris in pits, assignable to Phase II of Nagarjunakonda. Animals mentioned above were maintained in a stage of domestication at Harappa, Mohenjo-daro, Chanhudaro, Nal, Maski, Utnur, etc. In view of the wide distribution of these animals in proto-historic sites of India, it is not unlikely that people here also knew the art of domestication. Site 47, ascribable to the last neolithic phase, was also possibly the remains of a pastoral people because of the general absence of tools for cultivation and the occurrence of large quantity of animal bones. The authors of this phase followed extended inhumation burial.

Phase III reveals fresh impetus in the technological approach. The developed tool-types, which include both agricultural as well as carpenter's tools and a mature pottery tradition became quite dominant in the scene of the neolithic horizon at Nagarjunakonda. Again, this phase may not be an outcome of the preceding culture-complex. The emergence of several types of tools and pottery appears to be a sudden phenomenon and it is, therefore,

more plausible to infer that this group reached the valley independently and settled down for a fairly long period. Basis for the later statement is the occurrence of cultural remains in good quantity in layers and the existence of houses on earth-fast poles. The previous period, needless to say, was characterised by pit-dwelling. The occupational dèbris at other sites in strata had either an insignificant deposition or was absolutely non-existent.

The abundance of animal bones would suggest that their food comprised mainly of edible animals. Fish-bones appeared only in this phase. But the effort to augment food supply by cultivation also is noticeable. There is however, no direct evidence of the knowledge of cultivation by these people since no cereal came to light in the excavation. But the presence of shoe last celts, weeding hoes, elongated celts and picks may imply at least the practice of hoe-culture. Querns and pestles provide additional evidence of the prevalence of a food-producing economy. Hence, the economy of the mature phase was markedly that of a mixed one when both the sources were equally exploited. The mortuary rites marked a slight departure; the extended inhumation burial was followed by a minority group and post-excarnation burial appeared to be the general custom in vogue amidst this people.

Short blade microliths now depended mainly on quartz-crystal instead of chert, and flake-tool has a continuity even in this period. But still it was practically free from definitely recognizable northern influence, save vaguely in the occurrence of discular beads, pottery discs, perforated vessels etc. It was only in Brahmagiri IA, Sanganakallu II, Maski I and Pikhlihal that the northern tradition was felt in some way or other. The absence in Nagarjunakonda of painted pottery, ribbon flakes, and Brahmagiri-Pikhlihal type of terracotta figurines, may indicate a somewhat pure assemblage, characteristic of the period prior to the arrival of the northern tradition. Incidentally, it may be mentioned that the occurrence of burnished or dull grey ware in early or the earliest levels of various chalcolithic sites like Bahal, Nevasa, Nagda, Ahar, etc. would point to the wide-distribution of grey ware, which is roughly co-extensive with the diffusion area of pointed-butt-axe. So far as the evidence of Nagarjunakonda is concerned, the red ware seemed to have an independent role and also earlier origin than the grey ware tradition. It is not known yet how and where the development of grey ware culminated as a tradition.

D. DATING

Dating in the absence of cultural superimposition is difficult to work out. Furthermore, primitiveness does not necessarily mean chronological priority since backwater cultures, specially when positioned in a secluded valley, are likely to remain static for a considerable time. So, the question of dating these cultures is fraught with great many problems. But at Nagarjunakonda, there is not a single site where the population was absolutely sedentary. It is, therefore, reasonable to consider the neolithic facies of this valley as a part of the widely diffused culture that flourished in different regions of the Deccan and Karnatak. Pottery-types of mature phase at Nagarjunakonda are comparable with those from Brahmagiri, Sanganakallu, Maski, Pikhlihal etc. The earliest phase of some of these sites is dated to C.1000 B.C. Since Nagarjunakonda is assignable to a period prior to the infilteration of the northern influence, the mature phase may be dated anterior to that of other

sites. Moreover, the use of copper did not assume any proportion whatsoever, in the developed phase of Nagarjunakonda. A date near about 1500 B.C. will be a reasonable estimation. The appearance of lipped bowl, a type very similar to its counterpart in the megalithic remains, need not be taken as indicative of a late date, unless factors like continuity of trait or atavistic phenomenon are completely eliminated.

The earliest culture of Nagarjunakonda appears to be even anterior to that at Utnur, which on the basis of the radio carbon test, is dated to C.2160 B.C.[1] Utnur pottery includes grey ware and the technique of burnishing was also known. Phase I of Nagarjunakonda does not exhibit any grey or burnished sherd. Further, tool-types definitely warrant a very early date—a date which should coincide with the beginning of neoliths in the Deccan and Karnatak. So far as the present knowledge goes this culture can easily be dated to a period earlier than C. 2500 B.C.

There is clearly a time-interval between the two strata of burials in the cemetery. Within living memory no people would wish to inhume a dead body right over an earlier group of burials. The deposit which intervened between the two working levels, had a thickness of not less than 1 ft., Considering both the aspects a date near about 2000 B.C. for Phase II which includes an earlier group of burials also would not be very widely off the mark.

Phase I	earlier than	2500 B.C.
Phase II		C.2000 B.C.
Phase III		C.1500 B.C.

E. DESCRIPTION OF CUTTINGS

1. SITE 45

The site occupying Division 12 of Sector S. VI (Pl. XXXIA) is mentioned in the excavation records as Microlithic site. The bulk of cultural material from this site comprised microliths, flakes of basalt or quartzite and crude pale brown hand-made pottery. It was only at the end of the excavation that a few neolithic implements were discovered.

Before excavation only one or two pieces of microliths were reported to have been found on the surface. A long row of trial slits was sunk towards the western part of this site before the spade could locate the acutal habitation. In these trenches hard natural rock was encountered only at a depth of 15·2 cm. below surface. The same evidence repeated in trenches dug towards the *nulla* bank. These proved barren so far as microliths or other associated objects were concerned.

Altogether 9 trenches were dug, of which those lying towards the eastern and the southern sides viz., A_4, B_4 and C_1 did not yield much cultural material. Natural rock was found here only at a maximum depth of 28·0 cm. below surface, whereas in Trenches A_3, B_1, B_2 and B_4 it was met at an average depth of 76·2 cm. Hard rock had a tendency

[1] See Appendix B on Radio Carbon dating for Neolithic remains of Nagarjunakonda.

for sloping down in mild gradients towards the north. In Trench A_4 was observed a big depression inside the hard rock filled in with dark brown compact gravelly deposit, named as layer 5, its maximum thickness being 30·5 cm. This appeared to be a localised deposit. On its top was found an assemblage of microliths, 4 neolithic tools, quartzite or basalt flakes and the pottery. It had a thickness, varying between 5·1 cm. to 20·3 cm. and was composed of dark brown gritty earth mixed with small angular stones. In Trenches A_4 and in the south-western quadrant of A_2 and A_1 microliths and pottery were recovered almost on the hard rock surface. Thus the working level was the top of layer 5 where the hard rock could be met at a lower depth, and where the overlying deposit was a thin mantle, the hard rock surface served as the basis of this people. A few microliths, but not a single piece of pottery, came from layer 3, which was conspicuous by the presence of rolled *Ikshvaku* pottery and lead coins. This deposit, average thickness being about 20·3 cm., was composed of compact light brown earth, mixed with sand and stone. A rubble wall was found cutting the layer 3. Layers 1 and 2, as a rule, did not yield any tool, not to speak of pottery (Pl. XXXIB).

Comparatively bigger sized flakes, found in layer 4 (Pl. XXXIIB), were in extremely good condition showing no sign of rolling. A few examples of palaeoliths also occurred in the layer. Pottery, no doubt, was very much fragmentary. From the north-western corner of Trench B_3 was found a cluster of chert cores and pebbles. In fact, there was a preponderance of cores and flakes over finished tools in Trenches A_1 and B_2. This area might have been the working spot. Layer 4 in Trench B_2 alone revealed indubitable specimens of the neoliths. Animal bones, so abundant at other neolithic sites, were scarce—only two samples of bones belonging to some birds and rodents were discovered in Trenchs A_4 and B_2.

2. Site 46

This was the richest neolithic site of Nagarjunakonda, and also covered an extensive area occupying Divisions 362, 363 and a part of 382 of Sector N V. A total number of 40 trenches were dug in the site proper. About 18 m. to the north of this area, a group of 10 trenches were laid to find out the extent of the site. This was termed as "northern extension" of Site 46.

The land surface was undulated with several outcrops jutting out here and there. But the ground level had a tendency to incline gently towards the north-east. This feature could be observed also at Site 46-A.[1] Here, like other sites, the area of habitation was enclosed by two belts of outcrops running in the north-south direction.

The disintegrated rock, generally dark brown in colour was found at varying depths ranging between 7·6 cm. as in Trench B_1 of 382 to 61 cm. Those occupying the southern end of the site, revealed too many outcrops and boulders. In Trench C_2 of 382, hard bed rock was encountered, at a depth of 17·8 cm. below surface. These trenches (Trenches B_2, C_3, C_4, C_5 etc.) also yielded pits and other cultural material. Trench B_2 disclosed a crushed

[1] This may possibly indicate the existence of a natural fold of the surface or a rain-water channel once serving as a feeder to the ancient rivulet.

urn containing two teeth of a child. It was kept in between two lines of outcrops but not very far off from the dwelling. This trench, like other ones of this area, exposed pottery, animal bones and flakes, deposited on the natural disintegrated rock surface. The natural surface was overlain by layer 2, about 7·6 cm. in thickness. The last pit, viz., Pit 40 found in the last but one trench towards south, seemed to be a post-hole. An upright rock, about 18 cm. high, and only 17 m. to the south-west of the said pit, stood conspicuously in this trench. One unfinished tool and a good number of flakes were recovered near this upright rock.

Beyond Trench C_1 or B_{11} the surface was comparatively free from outcrops and boulders. Here natural disintegrated rock was discovered at depths varying between 30 cm. to 61 cm. below surface. Layer 2, with an average thickness of 18 cm. was found superimposed over the natural disintegrated rock. It was a compact deposit of dark brown gravelly earth revealing pottery, animal bones. microliths, neoliths and also occasionally palaeoliths. Near pits, this layer generally yielded ash also. Layer 1, composed of yellowish sand and earth mixed with some quantity of gravel, varied in thickness between 5 cm. to 25 cm. This deposit exposed about 10 neoliths, besides microliths and pottery. Layer 2 was the contemporary stratum, co-eval with the pits and the neolithic culture of the site (Pl. XXXIIB).[1] Pits, invariably cut into disintegrated rock, revealed the same cultural equipments as those from the stratum. Neoliths were picked up in plenty from the surface of this site, and in a few cases, they were even found embedded into the present land surface. Some of the pits, with smaller dimensions, were identified as post-holes, and the supposed huts were situated in the areas occupied by Trenches B_4, C_4, B_5, C_5, of Division 362 and Trenches E_2, E_3, A_2, B_1, B_2, C_1 of 363.

The stratigraphy of the northern extension of the site, occupying portions of Divisions 342, 322, 301 was practically the same as that of the main site. Dark brown natural disintegrated rock was discovered at a depth varying between 20 cm. to 53 cm. It was, however, superimposed by layer 2, composed of black gritty earth varying in thickness between 15·5 cm. to 36 cm. The blackness of the layer, was possibly due to the presence of organic matter. Layer 1, about 12·5 cm. in thickness, was composed of greyish earth and sand. A rubble wall belonging to historical times was found constructed on layer 2 in Trench C_5 of 322.

3. Site 46-A

This site is situated in Divisions 3 and 13 of Sector VI and 383 of N.V. 25 squares were dug in this area, flanked, as usual, on all the sides by granite outcrops. Natural rock or pulverised rocky deposit, either dark brown or whitish in colour, was found at a varying depth of 12·7 cm. to 91 cm. Trenches, generally barren in cultural deposits, revealed natural rock only at a depth of 12·7cm. below surface.[2] The elevation or contour of hard natural rock in different trenches and the general lay-out of 18 pits showed that only a small strip,

[1] It has been contended (*Ancient India, Vol. 13,* page 57) that layer 3 or pulverized rocky deposit was the actual tool-bearing horizon, but it was found on further observation and subsequent digging to be a natural deposit bereft of cultural objects.

[2] From this deposit was discovered a calcinated animal bone, presumably of *Bos* family.

not more than 7·62 m. wide and looking like a crescent, was occupied by the neolithic people. It was the natural fold of the rugged surface that offered them suitable environment for their habitation. A gravelly deposit mixed with earth, about 46 cm. in thickness, was found superimposed over the natural disintegrated rock, exposed at a varying depth of 38·5 cm. to 91 cm. in Trenches C_1, C_2, C_3, C_5, B_3, B_4, D_1 and D_5 of Division 3. All the pits came to view from this area. This deposit over the natural, represented two layers, viz., layers 2 and 3. Layer 3, having an average thickness of 17·8 cm. and containing few sherds of neolithic ware, animal bones and flakes, was made of dark brown gravel and sub-angular stones. In Trench C_2 of Division 3 this layer yielded two flakes of basalt, while only two specimens of ground celt, one of them being unfinished, were found at a depth of 12·7 cm. below surface in the same layer near Pit 1A. Layer 3 in trenches lying in Division 383 of N.V generally disclosed neolithic pottery. All the pits were dug from the top of natural surface into disintegrated rock. The pottery, microliths (Pit Nos. 1C, 2, 3, 5, 8-A, 9 and 11), disc-circular beads (1-D 8, 8-A and 10), neoliths (Pit 8), animal bones etc., came from these pits of varying dimensions and depths. Layer 2, a light brown deposit of gravelly earth, average thickness being 28 cm. yielded no object connected with neolithic culture. In some trenches layer 1 exposed few rolled sherds of the *Ikshvaku* period. Only few tools were picked up from the surface before excavation.

The major portion of all the pits were filled in with gravel and stones. The cultural objects came only from their bottom part, but by no means from uniform depths. Sometimes, big stones and boulders were found inside them, and there can be no doubt that Pit 8, which laid bare the remains of an adult male skeleton, and Pits 9 and 10 were intentionally filled up with stones. Two post-holes, away from pits and without any alignment were also cut into the natural disintegrated rock. It was difficult to ascertain whether they had any connection with any structure. Both the post-holes were of 17·8 cm. in diameter. Pits 1A, 2, 3, each of them associated with two post-holes situated opposite to each other, could have been covered with some roofing in the form of leaves, mat or thatch. Pit No. 1C had revealed three post-holes, their average diameter being 17·8 cm. These post-holes were of two kinds. Post-holes reaching upto the bottom of the pits, were observed in cases of Pits 1C and 3, whereas Pits 1A and 2, had post-holes having an average depth of 28 cm. The latter category seems to have been similar to those of the outside group. The purpose of the former group with deep shaft-hole was possibly for covering the sides of the pits with mat or wattle-work.

The area contiguous to Pit 8, though falling in Division 383 of Sector N.V was taken up subsequently to find out whether skeletal remains could further be traced. Half a dozen trenches were dug but no skeletal remains came from nearby areas. Two Pits, Nos. 11 and 12 were discovered here also. The northernmost trenches, occupying the fringe of a huge outcrop, exposed natural disintegrated rock at a depth of 1·52 m. It would clearly confirm that the ground level had a tendency to incline towards north-east.

4. Site 47

This site occupied Divisions 320, 339, 340, 359, 360 and 380 of Section N IV. Divisions 359 and 360 were rich in cultural materials, which came mostly from 21 pits, distri-

buted in Trenches A_1, A_2, A_4, C_2, and E_4 of 360 and C_1, D_4. and E_1 to E_3 of Division 359 (Pl. XXXIII). The natural disintegrated rock in these trenches was met at an average depth of 40·5 cm. overlaid by layer 3, with maximum thickness of 30 cm. This layer composed of gritty earth and ash, yielded neolithic tools and pottery from its bottom region. Pits were cut into natural disintegrated rock from the surface of the latter, which appeared to be the working level of the neolithic people. Calcinated remains of a tortoise shell was observed in the disintegrated rock in Trench E_2, Division 359.

Very often pits were found near granite outcrops. In some trenches, viz., E_2 of 359 in which Pits 4 and 4A were discovered, disintegrated rock was found at a depth of only 17·8 cm. below surface. Here also the neolithic people preferred the natural fold of the undulated rocky surface as their suitable habitat. Pit 12, was located almost within a ring formed by granite outcrops, running in north-south direction, the remains of which were also exposed in Trenches C_1, C_2, C_4 and E_2 of Division 360. Another line of outcrops was exposed in Trenches B_3 of Division 340, B_1, B_2, and A_2 of Division 360, and pit 1 occupied the southernmost fringe of this row. A group of 10 pits (Pits 10, 11, 12, 13, 14, 15, 16, 17, 18, and 8) almost forming a cluster, had been occupying the area round a big outcrop. Thus the deposit over the rocky terrain and uneven surface was rough and thin. Layer 2 composed of dark brown gritty earth (Pl. XXXIIC) and stones revealed 6 specimens of neolithic tools and a few palaeoliths but neolithic pottery was seldom observed in this deposit. In this area tools were found in abundance on the surface also. The bulk of pottery consisting of burnished-grey, dull-grey, pale-red ware, black-slipped ware and brown gritty ware, came from pits. Pit 11 produced maximum number of microlithic flakes and large brown gritty ware, quantity of dull reddish brown ware.

Apart from polished axe and pottery this site also yielded animal bones, disc-circular bead and microliths but the last two categories were confined generally to the inside of the pits.

Layer 2 of Trench E_4 Division 360, brought to light a damaged urn containing bones and milk-teeth of a child. Stratigraphy of this area was slightly different from that of the other trenches of this site; here layer 2 contained the contemporary deposits overlaid by humic earth. Site 46 revealed similar stratigraphical evidence.

5. Stratigraphical Correlation

The top of disintegrated rock was the cradle of neolithic people in the valley(Fig. 47). This deposit was one and the same in Sites 46, 46A and 47. The earliest graves of Site 68 were also dug into this formation which sometimes yielded calcinated remains of animal bones, otherwise it was bereft of cultural objects and artefacts. This stratum, however, was practically non-existent at Site 45. Its absence at this site and the fact that tools were found right over the rock in many trenches need not be taken as indicative of greater antiquity of the industry discovered there. The process of disintegration must have taken place everywhere in the valley. The weathered deposit in course of time might have found its way to a comparatively lower regions, possibly to the north of this site where disintegrated rock was encountered at a depth of 1·8 mts. below surface. One thing seems certain that the neolithic

culture of the valley, as a whole, started its career on this disintegrated deposit, presumably a derived erosional accummulation. Stratigraphy does not help much in determining the relative sequence of the contemporary deposits of the various sites because nowhere was to be found any sequential evidence or superimposition of different cultural strata. Nonetheless, two layers of burial in the cemetery, though separated by a thick deposit, probably denote continuity of neolithic phase in the valley. Layer 2 of Site 46 and Layer 3 of 46A and 47, were co-eval with the life of the neolithic culture as a whole of Nagarjunakonda. Site 45 (Layer 4) witnessed the dawn of neolithic culture of the valley; pottery and artefacts of the site belonged to a stage not as advanced as the mature phase of Nagarjunakonda stone-axe culture.

The continuity of the neolithic occupation may further be envisaged, of course, not on any sure ground, from the presence of three tool-bearing strata of Site 46. Layer 2 of Site 47 also yielded a good percentage of neoliths. For fixing up the relative sequence of various sites one has to depend more on detailed analysis of the cultural objects rather than on stratigraphy.

F. PITS FROM DIFFERENT SITES

The remarkable feature of all the neolithic sites, save site 45, was the occurrence of pits of different shapes, sizes and depths. The identification of these pits, 152 in number, inclusive of post-holes, offers a formidable problem. A depression inside hard rock, which did not appear to be a natural formation, was noticed even in Sites 45 but the actual purpose is difficult to ascertain. The largest number of 101 pits, including 12 post-holes, came to light from Site 46. Site 46A revealed 29 pits inclusive of 11 post-holes. The later category could not, however, be traced in Site 47 where altogether 22 pits were discovered. Mention has already been made about their location near or in between outcrops. Invariably they were excavated into weathered or disintegrated rock. Top few inches had been filled in with drifted gravel and sub-angular stones, the cultural debris being generally confined to the lower half. There were, nonetheless, cases where neoliths occurred right on top of pit-deposits. Before taking up a discussion about the purpose of these pits it would be worthwhile to describe them briefly from the point of view of their contents, shapes, measurements, etc.

1. Description

(a) Site 46 (Fig. 48)

Pit 1: Irregular in shape, measuring 3·22 m × 2·60 m., depth ·76 m. Situated in between two natural outcrops. Inclining natural rock towards north probably served as a step for getting into the pit. A part of one of its sides lined with stones. Ashy and burnt earth noticed inside. Other finds comprised large number of animal bones, flakes of basalt and greyish quartzite, quartz-crystal microliths, 6 disc-circular paste beads, neolithic axe, pestles, hammerstones and a quern. But the most important discovery was two fragments of copper. About 200 sherds, of which about 50% belonged to red ware, were recovered from this pit. Types include urns, bowls, vases, dish, *lota* type and lid-cum-dish and base of a cup or stopper. One spout, a few sherds with raised band and a sherd, with multi-groved bands were also recovered. A diminutive lid, with shallow body and limited flat base, has two perforations on sloping sides.

Pit 2: Irregular in shape measuring 2·82 m. × 1·77 m. partially scooped out. Filled in with blackish earth, ash charcoal. Animal bones, basalt and quartzite flakes and 2 paste beads occurred. A tool of pick type was discovered on the topmost deposit. Pottery types include 1 plate and 1 bowl with everted lip and one ochre-washed sherd.

Pit 3: Circular in shape, diameter 1·57 m. depth ·76 m. 180 pieces of animal bones, about 300 sherds, of which 235 belonged to grey ware and 35 flakes unearthed from this pit. 9 paste beads, varying in diameter between 4 mm. to 9 mm. were also found. Pits 1, 1A, IB situated closed to each other (Pl. XXXIVA).

Pit 4: Irregular in shape, measuring 1·61 m. × 1·44 m. depth ·91 m. Cut into weathered rock. Pottery, mostly grey ware, animal bones, flakes, mostly of greyish quartzite, a neolithic adze, 3 quartz-crystal microliths, 2 paste beads recovered. Thick ashy deposit inside.

Pit 5: Irregular in shape, measuring 1·60 m. × 1·33 m., depth ·76 m. Cut into weathered rock. Animal bones, pottery and flakes much ladden with ash.

Pit 6: Circular in shape, diameter 1·06 m., depth ·56 m. Ash, charcoal, animal bones, pottery, quartzite and basaltic flakes unearthed from it. Two granite boulders and one basaltic lump, near which was found a pick, discovered on the flattish floor of the pit. Pottery-types comprised mainly vase, bowl and urns.

Pit 7: Irregular in shape measuring 1·17 m. × 1·04 m. depth ·61 m. Finds consisted of a few pieces of animal bones, pottery and flakes, all embeded in an ashy deposit. Pits IC, 3, 2, 4, 5 and 28 formed one line running north-south. A recognizable pottery type is a sherd of medium sized vessel.

Pit 8: Irregular, measuring 1·06 m. × 0·92 m., depth not fully reached, packed with stones and boulders. A whetstone, besides a few pieces of animal bones and pottery, recovered.

Pit 9: Irregular, measuring 1·11 m. × ·99 m. depth ·61 m. Floor a flat granite bed, a boulder resting on the later. 609 sherds, mostly grey ware, 127 animal bones, a terracotta disc, a mussel-shell, microliths and flakes constitute the antiquities from the pit. Recognizable pottery types are vase and a lid-fragment. Ash and charcoal also found.

Pit 10: Irregular in shape, measuring ·81 m. × ·74 m. depth ·36 m. Probably a post-hole. Only 4 fragments of animal bones besides a few sherds, which include fragments of vase and bowl; one of the sherds shows raised band.

Pit 11: Oblong in shape, measuring 1·60 m. × ·89 m., depth only ·23 m. Floor—a flat granitic bed wherefrom were discovered a hammerstone, basalt lumps, a broken neolithic tool, apart from animal bones, flakes and pottery, 2 fragments of which ascribable to lamp type.

Pit 12: Oblong in shape, measuring 2·02 m. × 1·00 m. depth varied between ·25 m. to ·33 m. Filled in with blackish earth and ash. 202 fragments of animal bones, 130 quartzite flakes, 5 quartz-crystal microliths, a neolithic axe, a disc-circular bead, a fragment of mussel shell, pestles and hammer-stones were recovered from the pit. 504 pot sherds, of which 401 belonged to grey ware, 52 black slipped and 51 of red ware, were found.

Pit 13: Oblong in shape, measuring 1·67 m. × 1·14 m. depth ·49 m. Filled in with ash and bits of charcoal. 11 quartzite flakes, 26 animal bone-fragments and a few grey ware sherds were discovered.

Pit 14: Circular in shape, diameter ·55 m. depth ·71 m. Probably used as post-hole. Cultural material came from top and comprised a hardened shell of nut (?), a few animal bones and two decorated sherds.

Pit 15: Irregular in shape, measuring 5·28 × 4·20 m. depth ·46 m. Full of blackish earth with patches of ash. Only portion of it Scooped out. Revealed 2 paste beads, a broken piece of shoe-last celt, pestles, scrapers, hammerstones, 49 quartzite flakes. 110 pieces of animal bones, a terracotta disc and 232 pot-sherds, besides 24 microliths, which include 3 fluted cores and 3 crescentic tools, made on quartz-crystal. Important pottery

type is a shallow bowl with horizontally splayed out lip, possibly for gripping. Pits 17, 17A, 17B, 17C were post-holes. Appeared to be a semi-subterranean dwelling.

Pit 16: Oblong in shape, measuring 1·16 m. × ·86 m., depth ·54 m. Wider at the bottom. Number of sherds 272, out of which 206 belonged to grey ware. 10 disc-circular beads, 11 quartz-crystal microliths, pebbles with battered ends and broken pestles came from the pit. A few boulders were also noticed inside. A layer of burnt earth was found superimposed by a thick ashy band inside the pit.

Pit 17: Irregular in shape, measuring ·74 m. ·69 m. Very little cultural debris. Ash noticed. A quartz-crystal bladelet was also found.

Pit 18: Oval in shape, measuring ·99 m. × ·96 m. depth ·91 m. Filled in with ash, charcoal and burnt earth, latter forming almost an arc. 78 sherds, 25 animal bones, 12 quartzite flakes, 4 quartz-crystal microliths recovered from it. Recognizable type of pottery is lid-cum-dish.

Pit 19: Irregular in shape, measuring 1·98 m. × 1·16 m. depth ·71 m. No ash. Only a few sherds, animal bones and quartzite flakes recovered. Other finds comprised of a neolithic axe, a microlith and 3 disc-circular beads.

Pit 20: Oval in shape, measuring ·69 m. × ·51 m. A post hole for Pit 15, cut into hard natural rock. One adze came from it. No ash found. 17C, another post-hole, yielded 2 river-worn pebbles.

Pit 21: Circular in shape, diameter ·99 m., depth ·31 m. No ash or charcoal. Meagre quantity of pottery and animal bones. A vase fragment with incised groove pattern is an important type of pottery. A pestle also recovered.

Pit 22: Circular in shape, diameter 1·16 m., depth 1·14 m. Exposed large quantity of ash, charcoal and burnt earth. 264 sherds—grey ware formed a large percentage. Fragment of vase with incised oblique slashes over bold rib-an important type. 37 pieces of animal bones, 25 quartzite flakes and a quartz-crystal bladelet also found. 12 disc-circular beads (4 specimens of 5 mm. diameter, 4 of 6 mm., 2 each of 4 and 7 mm. diameter) were discovered. Pit wider at the base.

Pit 23: Circular in shape, diameter ·61 m. A few sherds and animal bones found. A post-hole.

Pit 24: Oblong in shape, measure ·89 × ·79 m. depth 1·22 m. Yielded 7 circular beads, 6 microliths, one of them on chert, a pottery disc, besides animal bones, flakes and pottery. A red ware sherd with comparatively finer texture and brick-red core also discovered. Ash and charchoal also found. Pit filled in with large-sized boulders.

Pit 25: Oblong in shape, measuring 1·32 m. × ·85 m. depth 1·22 m. 281 pot-sherds mostly of grey ware, 56 fragments of animal bones, 34 quartzite flakes, 19 disc circular beads of either paste, shell or steatite (3 of 4 mm. diameter, 3 of 5 mm., 6 of 7 mm., 2 of 3 mm. 1 of 13 mm. diameter), 7 microliths of quartz-crystal including a lunate and a core-scraper recovered. Full of ash, charcoal and burnt earth. Recognizable pottery-types were urn and a lid-fragment.

Pit 26: Irregular in shape, measuring 2·84 m. × 2·01 m., depth ·61 m. Ash, charcoal and burnt earth found inside. 510 sherds, mostly of grey ware, 34 greyish quartzite flakes, 91 fragments of animal bones, 10 microliths, mostly of quartz-crystal, 3 disc-circular beads and a broken neolithic tool came from this pit.

Pit 27: Oval in shape, measuring 1·04 m. × ·85 m. depth 1·22 m. 125 pieces of animal bones, 12 microliths including one backed blade, a lunate, a point and a chert blade, and 4 disc-circular beads, besides pot-sherds and greyish quartzite flakes. Ash also found.

Pit 28: Circular in shape, diameter ·46 m. depth ·91 m. Only a paste bead recovered. A post-hole.

Pit 29: Oval in shape measuring ·71 m. × ·51 m. depth ·76 m. 2 paste beads, a crystal flake and a few pieces of pottery and animal bones discovered from middle portion of the pit-deposit. Probably a post-hole.

Pit 30: Circular in shape, diameter ·28 m. Only ash and a flake recovered. A post-hole.

Pit 31: Circular in shape, diameter 1·15 m. Finds comprised mostly animal bones. A microlith of quartz-crystal also found. Pottery mostly red ware showed water-logging.

Pit 32: Circular in shape, diameter ·41 m. A post hole. Barren in pottery. One microlith and 2 quartzite flakes also discovered.

Pit 33: Oblong in shape measuring 1·58 m. × ·57 m. Full of blackish earth. Redware predominates. Types include vase, urn, flat based bowls and also sherds with raised band. A few sherds of unslipped red ware also noticed—slip peeled off possibly due to water action.

Pit 34: Oblong in shape, measuring 5·18 m. × 4·53 m. depth ·76 m. Pottery mostly red ware. 484 animal bones, 83 greyish quartzite flakes, 2 microliths, 4 disc-circular beads, a whetstone discovered from the pit.

Pit 35: Circular in shape, diameter 1·27 m. depth ·71 m. Exposed ash, charcoal, burnt earth and large quantity of pottery and animal bones, besides 4 quartz-crystal microliths.

Pit 36: Circular in shape, diameter ·99 m. depth 1·06 m. Large number of animal bones and pottery recovered, apart from blackish earth, ash and charcoal. Percentage of red ware is more than grey ware.

Pit 37: Oval in shape, measuring 1·35 m. x 1·27 m. depth 64 m. Besides pottery and animal bones, it yielded 4 quartz-crystal microliths and 5 disc-circular beads. A big boulder was found resting on the flattish floor of the pit (Pl. XXXIVB).

Pit 38: Oblong in shape, measuring 2·23 m. × 1·42 m., depth ·59 m. Dug by the side of an outcrop. A large quantity of pottery, mostly grey ware, animal bones and quartzite flakes recovered from this pit. Pottery-type represents shallow bowl, cylindrical vase, flat based bowl, vase with closing and grooved rim, a miniature intact spouted vessel and a square based, though straight-sided, miniature pot. Vase with closing rim and square based pot occurred only on this pit. Other unique pieces, a rimfragment of a miniature vessel, made of horn. 2 axes, 2 chisels, 1 adze and 2 celts with elongated form came from this deposit. 2 more neoliths recovered from north-western corner of nearby outcrop. 2 celts with elongated form placed side by side intentionally, possibly connected with some ritual; 13 quartz-crystal bladelets, 2 fluted cores, a piece of conch-shell also were found. Grey ware formed a high percentage in this deposit.

Pit 39: Circular in shape, diameter ·69 m. depth ·91 m. A few animal bones and pottery only found. Possibly a post-hole.

Pit 40: Oval in shape, measuring 1·49 m. × 1·02 m. Produced pottery, animal bones, quartzite flakes, 9 beads either of paste or shell, 3 microliths, one being a backed blade on chalcedony. Burnt earth was found in plenty.

Pit 41: Circular in shape, diameter ·53 m. A post-hole. Not excavated.

Pit 42: Circular in shape, diameter ·51 m. depth ·91 m. Yielded fish and animal bones and a few sherds. A post-hole.

Pit 43: Circular in shape, diameter 1·45 m. depth ·91 m. 210 sherds, 133 fragments of animal bones, 37 quartzite flakes, 3 microliths including a lunate on crystal, a broken blade of chalcedony, and one paste bead recovered from the pit. A broken piece of shoe last celt also found. Full of blackish earth.

Pit 44: Oval in shape, measuring 1·47 m. × 1·11 m. depth 1·06 m. Revealed 3 microlithic bladelets of quartz-crystal, 4 disc-circular beads varying in diameter between 13 mm. to 15 mm. and a neolithic axe, besides animal bones, pottery, ash and charcoal.

Pit 45: Oblong in shape, measuring 2·00 m. × ·61 m. depth varied between ·36 m. to ·46 m. No ash or charcoal found. Revealed usual animal bones and pottery.

Pit 46: Circular in shape, diameter 1·32 m. depth ·36 m. A paste bead, a perforated sherd of red ware vessel, an over burnt piece of a handle-like object and a short-spout comprised important finds. Ash, charcoal, animal bones also found.

Pit 47: Circular in shape, diameter ·69 m. depth ·76 m. No ash or charcoal. Paucity of cultural materials like pottery and animal bones. One sherd possibly shows ochre washing.

Pit 48: Circular in shape, diameter ·75 m. Not excavated.

Pit 49: Circular in shape, diameter 1·16 m. depth ·91 m. Revealed ash, charcoal, pottery, animal bones, quartzite flakes and an oblate pottery disc. Big boulders recovered from inside.

Pit 50: Circular in shape, diameter 20 cm. A post hole.

Pit 51: Oval in shape, measuring 1·04 m. × ·84 m. Pottery, animal bones and a pottery disc found.

Pit 52: Circular in shape, diameter ·34 m. depth ·91 m. One neolithic axe and a microlith discovered. Possibly a post-hole.

Pit 53: Circular in shape, diameter ·90 m. depth only ·23 m. Ash, charcoal and few fragments of pottery and animal bones came to light.

Pit 54: Circular in shape, diameter ·46 m. on top ·31 m. at the base, depth ·69 m. No ash or charcoal. Three pebbles, a microlith, few sherds and animal bones unearthed. A post-hole.

Pit 55: Circular in shape, diameter 1·27 m. depth ·96 m. Yielded 652 sherds, 293 pieces of animal bones, 4 microliths, 1 broken neolithic axe, 11 quartzite flakes, 7 disc-circular beads. Blackish and burnt earth, ash and charcoal most conspicuous in this pit. Pottery types include a tubular spout and a fragment of cylindrical vase.

Pit 56: Oblong in shape, measuring ·71 m. × ·39 m. No ash or charcoal. Only three pieces of pot-sherds were found.

Pit 57: Oval in shape, measuring 1·30 m. × 1·01. Not scooped out completely. Two basalt lumps with flake-scars found inside. A broken neolithic axe, 3 beads, 2 crystal bladelets, besides ash, charcoal, pottery and animal bones were recovered from the pit.

Pit 58: Circular in shape, diameter ·81 m. Not excavated.

Pit 59: Oval in shape, measuring ·92 m. × ·72 m. Unexcavated.

Pit 60: Circular in shape, diameter 1·22 m. depth 1·32 m. Yielded 539 sherds, mostly grey ware, 392 pieces of animal bones, 86 quartzite flakes, 3 disc-circular beads, 2 microliths and an adze. Burnt earth encountered.

Pit 61: Circular in shape, diameter ·93 m. Produced one paste bead apart from pottery, animal bones and quartzite flakes.

Pit 62: Oval in shape measuring 1·01 m. × ·76 m. depth ·44 m. Filled in with ash and charcoal. Yielded an axe-hammer, an adze, besides flakes, pottery and animal bones.

Pit 63: Circular in shape, diameter ·66 m. depth ·63 m. Most important finds, a neolithic axe and a barrel-circular-cylinder stone bead. Ash, animal bones and pottery also found. Red ware outnumbers grey ware.

Pit 64: Circular in shape, diameter ·76 m. Not excavated.

Pit 65: Oval in shape, measuring 1·42 m. × 1·30 m. depth .61 m. Yielded a broken neolithic tool apart from flakes, animal bones and pottery.

NORTHERN EXTENSION AREA (Fig. 49)

Pit 66: Circular in shape, diameter 1·06 m., depth 1·42 m. Ash, charcoal, blackish earth and in the lower deposit, burnt earth noticed. Mostly unburnished grey ware. Animal bones, some of them charred, and quartzite flakes unearthed. A fragment of a shoe-last celt and fluted core of quartz-crystal also found.

Pit 67: Oblong in shape, measuring 1·76 m. × ·71 m. Packed with rubbles. Unexcavated.

Pit 68: Circular in shape, diameter ·81 m. depth ·91 m. Blackish earth and ash. Pottery, animal bones and quartzite flakes little in quantity.

Pit 69: Circular in shape, diameter ·69 m., depth ·76 m. Contents same as above.

Pit 70: Irregular in shape, measuring 2·19 m. × 1·14 m. Packed with rubbles. Grey ware and black slipped have higher frequency. Flakes, animal bones and a neolithic pick with double working edge also discovered. Pits 50, 50C surrounded by Pits 50A, 50B, 51, 51A, 51B and 51C.

Pit 71: Oval in shape, measuring 1·24 m. × ·76 m. depth ·71 m. Also packed with rubbles. Finds constituted grey ware sherds, flakes of quartzite and animal bones.

Pit 72: Oval in shape, measuring 1·06 m. × ·61 m. depth ·71 m. Filled in with blackish earth. Pottery, animal-bones and quartzite flakes also found.

Pit 73: Circular in shape, diameter ·51 m. depth ·71 m. practically no antiquities.

Pit 74: Oval in shape, measuring ·79 m. × ·56 m. Unexcavated.

Pit 75: Oblong in shape, measuring 2·57 m. × ·96 m. depth ·61 m. Situated in the centre of a supposed hut. Pit 52C situated just by its side. Full of blackish earth and ash. A blunt-butted axe found on top. Usual types of flakes, animal bones and pottery also unearthed.

Pit 76: Circular in shape, diameter ·56 m. depth ·91 m. Full of ash. Only one animal bone fragment discovered. A post hole.

Pit 77: Circular in shape, diameter ·79 m. depth ·76 m. A few pieces of pottery and a fabricator discovered. Ash also noticed.

Pit 78: Circular in shape, diameter ·96 m. depth ·91 m. Full of ash and blackish earth. Besides pottery and animal bones, a chert flake and a crystal bladelet also unearthed.

Pit 79: Oval in shape, measuring ·63 m. × ·48 m. Unexcavated.

Pit 80: Circular in shape, diameter ·66 m. Ash noticed. One disc-circular bead also discovered.

Pit 81: Circular in shape, diameter ·31 m. Ash observed. A post-hole.

Pit 82: Oval in shape, measuring 1·14 m. × 1·13 m. Only few bits bones and pottery found. Not fully excavated.

Pit 83: Oblong shape measuring ·99 m. × ·59 m. Only pottery noticed.

Pit 84: Circular in shape, diameter ·69 m. Full of blackish earth. Animal bones, quartzite flakes and pottery noticed.

Pit 85: Irregular in shape, measuring 2·39 m. × 1·83 m. depth ·46 m. Filled in with ash and blackish earth. Large quantity of grey ware. Animal bones only a few. But remains of an animal skeleton, possibly a

deer, without head came to light. Skeleton in north-south orientation. Difficult to affirm whether it was sacrificed since no cut on neck vertebrae was noticed. But occurrence of two intact grey-ware urns, one below the skeleton and the other one slightly away, a disc-circular bead found on shoulder bone may suggest some ritualistic burial of the animal skeleton. Deposit below the skeleton yielded cultural materials like a broken butt of a neolith, a crystal core, 2 crystal flakes and another disc-circular bead, besides animal bones and pottery, all ladden with ash (Pl. XXXVA).

Pit 86: Circular in shape, diameter ·91 m. Situated by the side of an outcrop. No ash noticed. Not fully exposed.

Pit 87: Irregular in shape, measuring 2·14 m. × 1·57 m. depth ·51 m. No ash or charcoal found. Revealed animal bones, grey ware sherds and quartzite flakes.

Pit 88: Circular in shape, diameter ·93 m., depth ·91 m. Pottery, charred animal bones and flakes exposed. Four post-holes, Nos. 6, 7, 8 and 9 were detected at four corners. The present one possibly a pit-hearth inside a hut.

Pit 89: Oval in shape, measuring ·76 m. × ·56 m. Ash, charcoal and flakes not noticed. A few pieces of animal bones and pottery unearthed.

(b) Site 46-A (Fig. 50)

Pit 1: Irregular in shape measuring 3·35 m. × 2·52 m. Large quantity of pottery, mostly red ware; fragmentary animal bones, some of the pieces charred; other finds comprised charcoal, basaltic and quartzitic flakes, basaltic cores, 5 microliths of quartz-crystal, one fragment of mussel-shell, stone balls, hammer-stones. Filling consisted of blackish earth mixed with drifted gravel. The biggest pit of the site, depth ·56 m although ledged part still shallower (Pl. XXXVB).

Pit 2: Circular in shape, diameter 1·83 m. depth ·66 m. Flat granite outcrop inside the pit. Traces of three post-holes, each with a diameter of ·18 m. found on east, west and southern edges. A few pieces of charcoal. 93 pot-sherds of which grey-ware forms negligible proportion. 35 fragments of animal bones. Other antiquities include a stone-ball, a hammer-stone, a pestle, 6 basaltic flakes, a quartz-crystal, bladelet, a beautiful example of crescentic tool on quartz-crystal (Pl. XXXVIA).

Pit 3: Circular in shape, diameter 1·14 m. depth about ·91 m. A few stones found on the top. Finds include a few pottery pieces and fragmentary animal bones, a paste bead and a hammer-stone.

Pit 4: Irregular in shape measuring 1·33 m. × 1·55 m. depth ·41 m. A few bits of charcoal, 40 pieces of animal bones and very little quantity of pottery came from the pit. One spheroid ball, with battered ends, found in association with 5 palaeoliths, 3 basaltic flakes, 3 greyish quartzite flakes also discovered. Possibly a working spot. Palaeoliths, picked up from the surface served as core or hammer-stone possibly.

Pit 5: Circular in shape, maximum diameter 1·16 m. depth from working level 1·04 m.; pottery, animal bones including three teeth, one basalt flake, a hammer-stone, a broken pestile constituted the cultural material. The débris inside the pit, mainly filled in with drifted gravel, mixed with earth. Red ware sherds show higher frequency; grey and black sliped sherds only a few. No ash or charcoal. About 1·98 m. to the west of this pit was found a post-hole, ·19 m. in diameter and ·31 m. deep. Wider at the base (Fig. 51).

Pit 6: Circular in shape, diameter 1·60 m. and depth ·86 m. 26 pieces of pottery; grey ware forms majority. 17 pieces of animal bones, a solitary example of basaltic flake. Two post-holes, each having a diameter of ·17 m. noticed on western and northern edges. No ash or charcoal. Two neolithic tools, one unfinished, discovered from layer 3, near this pit. Wider at the base (Fig. 51).

Pit 7: Circular in shape, diameter 1·45 m. depth 1·94 m. A few stones on the top of the pit were noticed. 53 pieces of pottery, 25 fragments of animal bones, 2 basaltic flakes, 1 paste bead and an indeterminate object

of stone with 2 incipient drill-holes came from the dèbris inside the pit. No ash was encountered. Grey ware forms the majority.

Pit 8: Circular in shape, diameter 1·35 m. depth ·76 m. An articulated adult male skeleton found inside it, with head to the north, was covered intentionally by a cairn heap. A paste bead found near the mandible of the skeleton. In the deposit, about 27.9 cm. thick; below the skeleton were recovered a number of animal bones, a few pot-sherds, mostly of grey ware and a neolith, besides another disc-circular bead of paste. Large quantity of ash was also found (Pl. XXXVIB).

Pit 9: Circular in plan, diameter 1·19 m., depth ·96 m. A cairn heap over the pit was noticed but did not yield any skeleton. Only 20 fragments of pottery, grey ware forming 50% of the total, six pieces of animal bones, a hammer-stone, 4 grey quartzite flakes and a paste bead came from its fillings.

Pit 10: Oblong in shape, measuring 1·58 m. × ·94 m. depth 1·24 m. Pit was packed with rubbles. It yielded 14 animal bone fragments, 33 pot-sherds, mostly of grey ware, 4 basaltic flakes, a pottery disc and a paste bead. Ash not noticed. Pits 8, 8A, 9 and 10 formed perhaps one group (Pl. XXXVIC).

Pit 11: Roughly oblong in shape with two post-holes. Maximum length 1·44, m, maximum breadth 1·27 m. The southern arm had a gradual slope serving as a ramp. Post hole on the east measures ·15 m., the one on the west measures ·20 m. both of them being ·33 m. in depth. Another post-hole, about ·91 m. to the east had a diameter of ·20 m. depth being ·25m. The number of sherds 161, out of which 85% belong to red ware; two sherds bore some sort of a graffiti marks. A few sherds of black slipped ware also found. A number of sherds bear raised bands; a flattish based bowl fragment also found. 303 pieces of animal bones and a few bits of charcoal. The maximum number of 41 microliths were found out of which 32 were made on quartz-crystal. Other finds represented by flakes of basalt and greyish quartzite, hammer-stone, stone ball, rubber and one unifacial pebble tool.

Pit 12: Circular in shape with a diameter of 1·80 m. depth being ·69 m. Full of ash and charcoal; four distinct ashy bands inside the pit. Two post-holes one on the east and the other on the west, were noticed. About 80 fragments of animal bones, some of them charred. The number of sherds recovered was 154; distribution of different wares is as follows: 22 (14·20%) unslipped red ware, 115 (74·67%) red ware, 17 (11·03%) grey ware. Unslipped ware is somewhat similar to Site 45 pottery. Raised band occurs on many sherds. Types comprise bowl with solid disc-base, a spout-fragment in grey ware, a flat based bowl, vases and urns. Pottery mostly lime-coated. Other antiquities include three pottery discs, 10 basaltic flakes, 23 microliths inclusive of 2 crescentic tools, 1 lunate and leaf-shaped flake, microliths made on quartz-crystal, chert, chalcedony and carnelian. Pit wider at the base (Pl. XXXVIIA).

Pit 13: Circular in shape, diameter 1.65 m. depth ·56 m. It yielded 3 basaltic flakes, a stone slab of uncertain use, 37 pieces of pottery, mostly red ware and a few fragments of animal bones. Ash not found.

Pit 14: Circular in shape, diameter 1·32 m. depth only ·44 m. Cultural materials constituted only a few sherds, animal bones and a flake of basalt. A few stones were found laid on the top of this pit. No ash or charcoal came from it.

Pit 15: Circular in shape, diameter 1·52 m. depth about ·91 m. Ash and charcoal found in plenty; ashy deposits formed two separate bands. 50 pieces of animal bones, 2 basalt flakes, one greyish quartzite flake, a pestle and 4 microliths including one fluted core on chert. This pit is very rich in pottery, the number of sherds being 350, of which 317 pieces belonged to red ware. Large number of sherds with raised band, one sherd contains irregular ribbings. Types include urns, vase, broad flat based bowl, deep bowl and possibly an example of double-pot in red ware. Pottery mostly lime-coated. A few specimens of unslipped red ware also present (Fig. 52).

Pit 16: Irregular in shape measuring 1·62 m. × 1·58 m. depth ·33 m. Only two sherds, a shell fragment and a few bits of animal bones found in association with one stone-anvil two bones and few basalt lumps. No ash or charcoal. Apparently a working spot.

Pit 17: Circular in shape, diameter 1·09 m. depth ·79 m. Little quantity of pottery, animal bones and a few basaltic flakes were recovered.

Pit 18: Circular in shape, diameter 1·42 m. Contents same as Pit 11. It was not fully scooped out. (Pl. XXXVIIB).

(c) SITE 47. (Fig. 53)

Pit 1: Circular in shape, diameter 1·70 m. depth ·94 m. 50 % of the pottery belonged to dull or burnished grey ware. Animal bones, flakes of quartzite and basalt also found. Pit full of ash, was wider at the bottom. A unique flat based *lota*-shaped pot also discovered (Fig. 54).

Pit 2: Circular in shape, diameter 1·35 m. depth 1·16 m. Pit covered with big undressed rubble, below which was a thick ashy deposit, mixed with charcoal. A dish fragment, similar to that of Nagda or Navdatoli, bowl types and a kind of lid constitute important pottery-types from this pit. This is also wider at the bottom.

Pit 3: Oval in shape measuring 1·57 m. × 1·01 m. depth ·96 m. Covered with undressed stones; mostly ashy deposit inside. Burnished and dull grey ware also found. Other finds comprise a hammer stone, basalt or quartzitic flakes and fragmentary animal bones.

Pit 4: Roughly oval in shape measuring 1·71 m. × 1·44 m. depth ·69 m. Yielded large quantity of ash and charcoal, fragmentary pieces of animal bones, flakes of basalt and quartzite. Total number of sherds discovered was 133, of which 53 belonged to dull grey ware, 20 black slipped ware and 8 of unslipped dull reddish brown ware. Pottery types include urn, vase, deep bowl, flat based bowl; many of the sherds lime-coated.

Pit 5: Circular in shape, diameter 1·32 m. depth 1·16. Pit filled in with drifted gravel, ash and charcoal. Only a few pieces of animal bones, flakes and pottery recovered. A short spout in grey ware and a red ware pottery with a big perforation at the flat base were note-worthy finds.

Pit 6: Roughly oval in shape measuring 1·98 m. × 1·50 m. depth ·36 m. A few boulders placed on top. Inside deposit ashy. Animal bones and flakes also occurred. Amongst pottery types the most important were channelled lipped bowl of black slipped ware with a reddish patch on its exterior, besides a hollow-based red ware bowl, an urn and a lid-type.

Pit 7: Roughly oval measuring 2·19 m. × 1·70 m. depth ·31 m. Apart from animal bones and flakes, this pit exposed 316 sherds of which 127 belonged to dull grey ware, 46 black slipped ware, 52 burnished grey ware, 68 red ware and 23 pieces of unslipped reddish brown ware. A few sherds showed lime-coating and one or two appeared to be examples of ochre wash. A flat based bowl, narrow-mounted jar and ring-based, *lota*-shaped grey ware pot constitute important pottery types. A chert microlith and 3 big sized paste beads also came to light.

Pit 8: Circular in shape, diameter 1·06 m. depth ·46 m. 149 pot-sherds, fragmentary animal bones, one pestle, flakes and a hammer-stone recovered, but no ash.

Pit 9: Circular in shape, diameter 2·06 m. depth ·66 m. Yielded flakes, animal bones, a neolith, a hammer-stone and a paste bead, besides 144 sherds, of which 53 belonged to dull grey ware, 29 burnished grey ware and 20 black slipped ware. Important types are a long grey ware spout, conical vase and lipped bowl with everted lip. Ash and charcoal also noticed.

Pit 10: Irregular in shape, measuring 3·40 m. × 1·54 m. the largest pit of this site, depth ·46 m. full of blackish earth but no ash. Red ware formed a big percentage. 4 microliths, one neolith, a hammer-stone, flakes, small pieces of animal bones sometimes charred, also discovered.

Pit 11: Irregular in shape measuring 2·19 m. × 1·04 m. depth ·46 m. Did not reveal ash or charcoal although largest number of 28 microliths, mostly on chert and maximum quantity of unslipped reddish brown ware, besides usual types of animal bones and flakes were unearthed. The distribution of pottery

was as follows:—Unslipped reddish brown ware 120, red ware 80, black slipped ware 35, grey ware 35. Pits 10, 11, 12, 15, 16 and 18 formed one cluster.

Pit 12: Circular in shape, diameter ·86 m. depth only. ·23 m. Yielded 2 microliths, a few flakes apart from pottery and animal bones, No ash, charcoal or boulders were observed.

Pit 13: Circular in shape, diameter 1·55 m. depth ·65 m. Only ash and a few animal bones and pottery came to light.

Pit 14: Oval in shape measuring 1·62 m. × 1·30 m. depth ·56 m. Meagre cultural materials.

Pit 15: Oval in shape, measuring 1·50 m. × 1·16 m. depth ·31 m. No ash or charcoal noticed. A few pieces of animal bones flakes and pottery were recovered.

Pit 16: Circular in shape, diameter 1·01 m. depth ·71 m. Revealed good quantity of charred animal bones but no ash. Besides pottery and flakes, it yielded a hammer-stone, a rubber and 2 microliths. Pottery mostly unslipped reddish brown ware.

Pit 17: Oval in shape, measuring 1·05 m. × ·84 m. depth ·61 m. Meagre quantity of pottery, animal bones but no ash or charcoal. An axe-hammer, quartzite and basaltic flakes and a hammer-stone also recovered.

Pit 18: Circular in shape, diameter ·69 m. depth only ·28 m. Full of blackish earth mixed with drifted gravel. Pottery, flakes and animal bones few in number.

Pit 19: Circular in shape, diameter 1·04 m. depth ·31 m. Revealed ash, animal bones, pottery, flakes and a small adze.

Pit 20: Circular in shape, diameter ·99 m. depth only ·31 m. Finds consisted of small quantity of pottery, animal bones and flakes. Ash also found. The western most pit of this site.

Pit 21: Circular in shape, diameter 1·04 m. depth ·71 m. Eastern most pit of the site. Contents similar to above.

Pit 22: Oval in shape measuring 1·70 m. × 1·22 m. No ash found. A few fragments of animal bones, pottery and flakes came from this pit.

TABLE I

Classification of pit according to shape & size

Site. 47

Shape of the pit	Below 30cm	31cm to 60cm	61cm to 90cm	91cm to 120cm	121cm to 150cm	151cm to 180cm	181cm to 210cm	211cm to 240cm	241cm to 270cm	271cm to 300cm	301cm to 330cm	331cm to 360cm	361cm to 390cm	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Circular	—	—	12, 18	8,16,19, 20,21	2,5	1,13	9	—	—	—	—	—	—	12
Oblong	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Irregular	—	—	—	—	—	—	—	11	—	—	—	10	—	2
Oval	—	—	—	—	15,17	3,4, 14,22	6	7	—	—	—	—	—	8
Total	—	—	2	5	4	6	2	2	—	—	—	1	—	22

2. Classification

It is apparent from the foregoing description that pits were roughly, (i) circular, (ii) oval, (iii) oblong and (iv) irregular in shape, the last category being generally larger in size than the other ones. The first two groups were quite deep pits despite their smaller dimensions. Circular pits of Site 46-A had, however, bigger dimensions, and the largest number of circular pits, forming more than 80% of the total, came from Site 46-A. But in Sites 46 and 47, it accounted for more than 50%. Oval and oblong ones did not occur at Site 46 and 47 respectively. The number of irregular pits was more in Site 46 than that of other two sites.

From the point of view of size, pits may be classified under 13 groups. It is evident from Table I that maximum number of pits barring the post-holes belonged to groups of 3, 4, and 5. These pits yielded invariably large quantity of ash, charcoal and burnt earth, the last category being traced only in Site 46. They were exceptionally rich in pot-sherds, generally ash ladden, and fragments of animal bones. Pits, with an average diameter of 0·9 m. to 1·6 m. are too small for living. The presence of burnt earth, sometimes in bands, besides ash and charcoal, provides a reasonable clue for identifying them as hearths. In Pit 30 of Site 46, a thick band of burnt earth was overlain by a regular strip of ash. Perhaps these three groups were used as *pit-hearths*, which form 61·22% and 34·48% of the total in Site Nos. 46 and 46-A respectively. In Site 47, however, they form 50% of the total. It appears, therefore that the more developed the assemblage in a particular site, the greater was the number of pit-hearths.

Groups 1 and 2, in view of their smaller dimensions, were probably used as post-holes. A few pits belonging to group 3, might have belonged to this type as well. The maximum number of 25 post-holes could be traced in Site 46, whereas the smaller variety was confined to Site 46 A. The evidence of Site 47 is some what different. The first group was meant to hold roof on poles of small branches or for the construction of partition walls of wicker-work or split sapplings. Possibly they were not permanent huts or dwellings. The other group might have been for holding thick wooden posts or tree-trunks. The rectangular huts in the Krishna and Godavari deltas in Andhra Pradesh are constructed on thick posts of palm trees. It is not unlikely that such thick posts were employed by the neolithic population of the developed phase. The settlement of Site 46 seems to have been a semi-permanent one, if not wholly sedentary.

Allowance should be given to the neolithic people for having wider post-holes, because their tools were not probably much conducive for digging narrow pits. Stones and pebbles discovered in such pits were meant to tighten the poles. They always preferred digging post-holes near outcrops in order to gain an additional support to the shaft. Pit 42 of Site 46 had a diameter of about 50·8 cm. on the top whereas the diameter at the bottom was not more than 30·5 cm. Pit-hearths and in some cases bigger pits were generally wider at the bottom and narrower on top. The picture was just the reverse in the case of post-holes. In this connection, it is worthwhile to mention that erosion due to rain or water might also have been responsible for widening the rim of pits. Nevertheless, it is fairly certain, in view of the repeated occurrence of such pits of similar dimensions, following at the same time in

very many cases a regular alignment, that they were used as post-holes. It is difficult to ascribe any other purpose for such pits.[1]

Pits belonging to groups 6 to 13 were capacious enough for a man or two to live in. The association of post-holes with some of the pits in Sites 46 and 46A suggests some structure over them. A few might have been their working spots (Pit 6 of Site 46-A). The biggest pit, Pit 15 of Site 46, had four post-holes at four corners. One of the post holes (Pit 17-C) exposed two river worn pebbles. The average depth of these pits was only ·46 m. Pits of other two sites were not so shallow as those of Site 46. In all likelihood, these bigger ones were the semi-subterranean dwellings of the neolithic people.

It is tempting to dispose of this theory of dwelling by identifying them as refuse-pits. It is too much to expect so high a sense of hygiene and sanitation from a people whose most absorbing preoccupation was the quest for food. Moreover, it is unlikely that a people would excavate refuse-pits without paying the least attention to build up their homes and hearths. Ash, unlike animal bones or pottery, was not a constant feature of the filling of the pits. Only a few in Site 46-A revealed ash or charcoal. Furthermore, the pottery or animal bones did not, in any way give an impression of funerary articles. They were found in various depths. Funeral objects should normally be placed at one or at best two levels. Grave-furniture generally include fairly intact goods belonging to the deceased. On the other hand, materials unearthed from these pits not only show too much wear and tear but also in most cases extremely fragmentary. Above all, not a bit of human bone was encountered in any of them. It is also not possible to identify them as pit-granaries since the content of pits did not reveal any grain at all. These are, however, evidences of a negative bearing. But the positive evidences are (i) the presence of post-holes near pits, (ii) pits of bigger dimensions and (iii) definite alignments of the excavated pits suggesting a regular settlement-pattern.

3. Alignment

It will appear from the plan of the respective sites that some alignment or arrangement was followed in respect of the excavation of the pits. Perhaps they tried to follow some settlement-pattern while excavating pits or more precisely, dwellings. Pit Nos. 1 B, 1C, 1D, 1, 2, 3, 4A, 5 and 6 of Site 46-A were arranged almost in a straight line; a row of circular pits were flanked by two oblong or irregular shaped pits. The other group of the same site, belonging to a slightly later phase, had a U-shaped alignment and consisted of Pits 1A, 8A, 8, 9, 10 etc. This group was marked by the paucity of cultural materials like pottery, animal bones etc. Nevertheless, pits of this site did not give an impression of amorphous or agglomerated distribution. Of course, topography rather than social pattern might have been responsible for their linear arrangement since all these pits were dug by the side of a granite bed. It cannot, however, be ruled out that the selection of the Site itself was motivated by their accepted notion of the settlement-pattern.

Majority of the pits in Site 47 were arranged in three different rows, parallel to each

[1] About 248 holes varying in diameter between less than ·31 m. to 1·53 are identified in Desert Fayum as fire-holes or fire-places See G. Caton-Thompson and E.W. Gardner, '*The Desert Fayum*', London (1934).

other. Pits 20 and 21, being the western-most and the eastern-most ones respectively, were away from the main rows. But Pits 10 and 11, girdled on the north-east by cluster, conspicuous by the absence of stones or boulders, ash and charcoal, is ascribable to Phase II of neolithic period. Pits 1, 2, 3 and 16 of Site 46 also constituted a compact unit. But here generally smaller pits were dug around a larger one or inside the supposed huts, the later also followed, as the evidence of the Northern Extension area shows, a linear alignment.

G. EVIDENCE OF DWELLING

That some form of dwelling was prevalent at Nagarjunakonda during the neolithic period may be evinced from the discussions in the preceding sections. It has already been stated that some of the post-holes conformed to some plan and alignment. But it must be confessed here that a plan for all the post-holes could not be traced out, nor can it be said emphatically that all the original post-holes had been detected in course of excavation. Small post-holes dug into disintegrated or pulverized rocky deposit and filled in with the same material may not maintain their original character after a long lapse of time. Even now the vaulted mat-huts and round conical huts, spread widely over the coastal Andhra Pradesh, are constructed over slender poles, not more than 5·1 cm. or 7·6 cm. in thickness. These are temporary huts and one can observe very well that with the shifting of such dwellings every trace of them gets completely erased out of the ground due to various human activities or natural factors. The use of such temporary huts by the neolithic population may not be a mere surmise. The absence of post-holes in Site 47 may be attributed to some such factors. Site 46A did not disclose any big post holes. On the other hand, their occurrence at Site 46 may be taken as a very definite evidence. Notwithstanding all these factors, the neolithic dwellings of Nagarjunakonda may be divided into two groups, namely, (A) houses with earth-fast posts supporting the walls and roof, and (B) subterranean dwellings. Both the types occurred in Site 46 but Sites 46-A and 47 revealed only traces of pit-dwelling. To put it the other way, the pit-dwelling was the characteristic feature of the earlier phase, whereas Site 46 witnessed a developed method of constructing shelters—an improved method of creating "artificial environment". But pit-dwelling was also in vogue side by side.

1. House-plan.

Plans for six houses could be restored in Site 46. Pits 47, 47-A, 25 and 25-C formed an alignment measuring about 3·58 m., 3·89 m., 5·28 m. and 4·81 m. on the north, south, east and west respectively. Two pits, namely 25-B and 25-D, were situated inside this supposed rectangular house (House-1). Pits 13 and 25-A were perhaps the remnants of a lean-to hut; in these cases outcrops had been serving as a natural wall to the west.

Another rectangular house (House-2), its four post-holes being represented by Pits 24-A, 30-A, 41-A and 42-A measured 6·10 m., 5·80 m., 6·79 and 7·40 m. on the north, south, east and west respectively. It contained three deep pits (Pits 30, 41 and 42) and was flanked by Pits 45 and 46 on the north, Pit 44 on the east and Pit 32 on the south. Pit 42 might have

been its pit-hearth like 25B of the supposed house enumerated earlier. The largest quantity of burnt earth, ash and charcoal came from Pit 42. The exact purpose of four other pits around the house is difficult to find out. So far as their dimensions are concerned they should be included in the category of pit-hearths. Actually Pit 44 yielded burnt earth, besides ash and charcoal. Thus, it appears that pit-hearths were dug not only inside the house but also around the huts.

The plan restored by connecting Pits 29, 31, 11 and 20, roughly conform to a square of 8·23 m. This was the biggest house (House-3) at Nagarjunakonda. An intermediary post-hole, about ·39 m. in diameter, could be detected on the south and the north. On the western side no pit or post-hole was found but a depression inside an outcrop, which appeared to be man-made and might have been to support another post-hole. The outcrop was almost in the centre of the supposed western side of the house. Post-hole No. 1, with a diameter of about ·28 m., in the centre of the eastern side was possibly the remains of partition wall, since three more examples, having an average diameter of ·20 m., could be traced on plan as well as in section. Pits 14 and 35 were its pit hearths, the former yielding a thick band of burnt-earth. This house also seemed to have been flanked on all the sides by five pits, namely Pits 17 and 34 on the south, No. 10 on the west, No. 9 towards the east and No. 12 on the north. Pits 9, 10, and 34 were large pits possibly used as dwellings. Pit 34 did not produce any ash or charcoal. But Pit 12 revealed big chunks of burnt earth; it was subsequently filled in with boulders. The existence of dwelling pits around such a bing house complicates the present identification, but ethnological evidence, mentioned below, may provide one with a reasonable analogy regarding the prevalence of under-ground dwelling alongside the superstructure built over the ground. Area enclosed by supposed houses was found to have been, more or less, even, in some cases natural outcrops had been dressed or cut, for obtaining an even surface inside the house.

The Northern Extension of Site 46 revealed three more houses. House 4, also rectangular on plan, measured roughly 4·88 m. × 2·44 m. It was enclosed by four main posts represented by Pits 50-A, 50-B, 51 and 51-B. The next house, House 5 (Pl. XXXVIII), measured 4·96 m. (from Pits 53 to 52-A) on the north 5·96 m. (from Pits 52-B to 53) on the east and 3·58 m. (from Pits 52-A to 52-F) on the west. Two other post-holes, Pits 52-D and 52-F, were also noticed. One oblong (Pit 52) and a circular pit (Pit 52-C) lay inside the house. Each of these houses enclosed one very big pit, apart from a pit-hearth. House 6, discovered to the north of House-5, was the smallest one of 2·74 m. square. Pit 57 was found in its centre and four post-holes (nos. 6, 7, 8 & 9) were noticed on four corners. Post-hole 9 was dug into a natural outcrop. These post-holes had an average diameter of about ·31 m. The settlement in the Northern Extension area had probably a north-south orientation. Three houses, mentioned above followed, more or less, a linear settlement pattern; the entrance into these houses was from south or south-west. The length of the southern wall was always found to be smaller than the other sides.

The variations in the measurements of the sides of a particular house may not be given undue emphasis. Broadly speaking, the neolithic houses of Nagarjunakonda followed either a square or rectangular plan and they measured roughly as follows:

House 1—4·88 m.	×	3·16 m.	(Rectangular)
,, 2—7·32 m.	×	6·10 m.	(,,)
,, 3—8·23 m.	×	8·23 m.	(Square)
,, 4—4·88 m.	×	2·44 m.	(Rectangular)
,, 5—5·80 m.	×	4·88 m.	(,,)
,, 6—2·74 m.	×	2·74 m.	(Square)
,, 7—5·49 m.	×	4·27 m.	(Rectangular: Semi-subterranean).

Number 7 (Pl. XXXIX) above may be identified as a half-subterranean house.[1] It was, in the main, a pit (Pit-15) in Site 46 measuring about 5·28 m. in the maximum length but was covered with a roof since four post-holes (Pits 17, 17-A, 17-B, 17-C) enclosing an area, sides measuring 5·57 m., 5·18 m., 4·50 m., and 2·37 m., on the south, north, east and west respectively, were traced at four corners. The entrance might have been from west, since this was the shortest of the sides. Moreover, two outcrops, just by the side of the two post-holes, had practically been serving as an entrance into the pit-house.

Two post-holes, situated quite away from any pit, came to light from Site 46-A. They were possibly remnants of flimsy huts since the diameter of the posts had an average of about 15·2 cm only, their depth being ·28 m.

2. Pit-Dwelling

Pits varying in diameter or in maximum length between 1·83 m. to 4·57 m. were in all likelihood used as underground houses. There were 15 such pits in Site 46, Site 46-A and 47 disclosed 5 and 7 pits respectively. It is, however, too hazardous to imagine the size of the neolithic population on the strength of the number of such big pits.

It is evident from House 7 that even the pits were provided with some roofing. Pit 26 of the same site had 5 medium sized pits around it although it is difficult to ascertain whether they were used as post-holes or pit-hearths. Similarly Pit 23 had Pits 24, 27 and 22 in its proximity. The concentration of a group of pits may also imply a family-unit. In Site 46-A, four pits of larger dimension were laid bare. Pit 2 (2·46 m. × 1·24 m.) of this site had two post-holes, one on the east with a diameter of ·20 m. and other towards the west having a diameter of ·18 m. The southern arm of this pit had a tendency to slope down, at least in two gradients. Whether it was an intentional arrangement, a substitute for steps, is difficult to affirm. But similar feature was observed in case of Pit 1 of Site 46, which had also possibly stone lining on one of its sides. Pit 1-B of Site 46-A had almost the identical feature as that of Pit 2 of the same site. Post-holes associated with Pit 2 of Site 46-A were about ·33 m. deep. But Pits 1-C and 3 revealed post holes having the same depth as those of the pits in both the cases they touched the bottom. Three post-holes, with an average diameter of ·18 m. were found on the eastern, western, and the southern edges of Pit 1-C. Pit 3 exposed only two, one on the east and other on the west. The purpose of deep shaft-holes reaching the bottom of pits, might have been for covering the sides with mat or

[1] A shallow pit, some 3·97 m—4·57 m. wide and not more than ·3 m. deep, was noticed at Utnur. (See F.R. Allchin *Utnur Excavations*, (Hyderabad, 1961) p. 65).

wattlework. This is, however, only a guess and no credence need be given until further evidence in this direction is available from other sites.

A plausible explanation is necessary for the presence of ash and boulders in some pits, specially of smaller dimensions. They are identified as pit-hearths. Dirt and squalor were possibly normal conditions in subterranean dwellings, Pits were hard to clean. After sometimes the shelters, specially the pit-hearths, were liable to be filled up. Subsequently, they were probably sealed up by putting boulders and stone. It may also denote 'break up'[1] of the settlement or the exit of the temporary occupants. The other explanation, possibly association with some funerary rites, is discussed elsewhere.

3. Archaeological and ethnological evidence

The excavations at Brahmagiri, Sanganakallu and Maski laid bare the traces of post-holes in the chalcolithic levels, but no definite alignment was discovered. Sir Mortimer Wheeler surmised on the evidence of post-holes that possibly rectangular structures might have been in use in the chalcolithic level of Brahmagiri.[2] Nagarjunakonda excavations revealed that rectangular or roughly square houses had been in vogue during the mature neolithic phase. In sizes they may be compared with the neolithic houses of Central Europe and Balkans where such houses of Skara Brae in Orkney range from 4·57 m. to 3·97 by 6·10 m. to 6·40 m.[3] The recent excavations at Navdatoli have exposed houses, either square, oblong or round on plan. The smallest hut had a diameter of 2·14 m. and the largest 3·35., The largest oblong house, measured 4·57 m.×9·14 m. A pit 2·14 m.×1·83 m.×2·14 m. was also discovered; it had post-holes all round. The evidence from Nevasa[4] seems to be more positive so far as pit-dwelling is concerned.

The excavations at Maski[5] and Sanganakallu[6] had disclosed pits of sizes comparable with those of Nagarjunakonda. But their purpose could not be affirmed in view of the small area excavated. Reviewed in the light of Nagarjunakonda finds, it appears that these cultures might have had a similar tradition. The finds from Maski pits have similarities to those from Nagarjunakonda. In recent years Burzaham[7] has also yielded examples of pit-dwellings. Besides stockades or cattle pens, the evidence from Period IA at Utnur may suggest the presence of half subterranean dwellings as well. That a space having a maximum diameter or length from 1·83 m. to 2·44 m. is spacious enough for men to live in is evident from modern huts of the poorer people of the coastal Andhra Pradesh. In many cases they

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[1] Childe, *Man Makes Himself* (1948, London) p. 97. He observes that "Among modern representatives of garden cultivation, a tendency for the Village to break up has been noted by ethnographers. Some of the young men hive off with their wives and start a new village of their own".

[2] R.E.M. Wheeler, *op. cit.* p. 203.

[3] V. Gardon Childe, *Progress and Archaeology*, 1945 (London).

[4] Indian Archaeology 1960-61—A Review, p. 20.

[5] B.K. Thaper, *op. cit.*, p. 25.

[6] B. Subbarao, *op. cit.*, p. 9.

[7] *Indian Archaeology*, 1961-62—A Review, p. 11.

range in diameter between 2·34 m. × 1·52 m. The chenchus[1] build houses of 2·44 m. to 5·49 m. diameter. Houses of still smaller dimensions are in use amongst the Tedas of Tibesti in the Sahara Desert. Their houses are only 1·5 metres in length and 1 metre high.[2] It has already been mentioned that in the developed neolithic phase house on the ground as well as pit-dwellings were prevalent side by side. The Tedas of Tibesti also live in underground houses (Hohlenbewohnen).

There is however, no testimony of pit-dwelling amongst the present aboriginal people of India. But the Bondo Highlanders[3] living in the wild and mountainous region north east of Machkund river in Orissa till recently used pit-dormitory which was reported by May[4] as early as 1873. According to him, "the classical Bondo dormitory is a pit, roofed over and entered by a small aperture, where the girls spent their evenings and entertained boy visitors from other villages". It is interesting to note that similar houses are still being built by the Wadras, a seminomadic people of Orissa. They earn their livelihood by digging earth, and live in areas of heavy rain fall.

The underground houses are still in use over a large part of Eurasia and North America, specially in the polar region. The representative type is a Koryak house in North-East Asia.[5] It was once widespread in China,[6] Japan,[7] Sudan, not to speak of Danubian Europe where a representative house measured 21·02 m. × 8·23 m. These houses are almost a necessity in regorous climate. Whether pit-houses of Nagarjunakonda were evolved by the neolithic people to combat against the hot sun or an inherited social trait is difficult to explain in the present state of our knowledge. The earliest neolithic phase of Nagarjunakonda did not reveal any trace of dwelling. It seems, however, not unlikely that pit-dwelling was a characteristic feature of the neolithic cultures of the Deccan and Karnatak. So far as precipitation is concerned, it seems, there is a climatic affinity of Nagarjunakonda with the Karnatak area of the Deccan plateau.[8]

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[1] C.V.F. Haimendorf, *The Chenchus*, p. 48.

[2] Kronenberg, *Die Teda Von Tibesti*, pp. 128 & 136.

[3] V. Elwin, *Bondo Highlanders*, pp. 74-76.

[4] J. A. May, Notes on the Bhondas of Jaypur, *The Indian Antiquary*, Vol. II, 1873, p. 237.

[5] H. L. Sapiro, *Homes around the world* (The Americal Museum of Natural History), Science, Guide, No. 124, p. 24.

[6] W. Howlls, *Man in the beginning*, p. 102. See also, William Watson, *China before the Han Dynasty*, London, 1961.

[7] Romyn Hitchcock, *The Ancient Pit–Dwellers of Yezo* Japan (Report of the National Museum for 1890) p. 417, Also see J. D. Kidder *Japan before Buddhism* London, 1959. pp. 43 & 85. Dwellings vary in length between 15 ft. to 17 ft. and only 2 ft. below the ground.

[8] The annual normals of rainfall at Raichur, Bellary and Macherla (13 miles from Nagarjunakonda) are 25·5, 20·04 and 24·43 respectively. Means of daily maximum air temperature of Raichur, Bellary and Rentachintala are as follows:—92·5, 92·9 and 94·3. For further details, see 'Monthly and Annual normals of Rainfalls and of Rainy Days' *Memoirs of the Indian Meteorological Department* Vol. XXVII, Part V, Manager of Publications 1949.

H. DISPOSAL OF THE DEAD

The funerary remains of the neolithic people inhabiting the valley may be classified into three categories, viz., (A) disposal of the dead in cemetery (Site 68) belonging to adults and children, (B) Disposal of infants in urns discovered from habitational areas and (C) skeletal remains of an adult male in a pit of Site 46 A. It is evident from Table II that the cemetery proper had laid bare 6 male adults, 3 female adults and a skeleton of a child. There were two grave-pits, each yielding double-burial, one of female and the other of male adult.

The cemetery disclosed two strata of burial. Stratum 3, represented by one adult male and an adult female, had brought to view remains of only articulated skeletons in primary burials. It had its continuity even in the next phase but the dominant mode of disposal of the dead was of post-excarnation-burial type, involving multiple process. Two double-burials belonged to this group also. Despite the absence of neoliths or other implements these two layers may easily be corelated on the basis of pottery, with the assemblages, uncovered at Site 46, 46-A and 47. So far as pottery is concerned both the layers unveiled almost identical types but the high necked vessel with long spout and straight-sided mug occurred only in the upper stratum. Pottery associated with Skeleton 5 of earlier stratum comprised only short-spouted vessels, with lower part of the body slightly recessed anp base well defined. One of them is a unique type in not having a neck and also for its better finish. This type does not occur in the habitational area.

I. General Remarks on Stratigraphy

Excavations have brought to light ten human skeletons, inhumed in eight-grave-pits. This area was quite away, (about one and half miles to the west) for the main neolithic settlement of the valley. The Cemetery-area, situated on a fairly high ground (level 380' MSL i.e. 115·75 m.,) lay between the river and an old nulla, flowing from south-east to west.

The site (Site 68) falls in Division 17 of Sector S XII. Altogether 12 trenches were sunk, besides several trail slits. Only four trenches, however, yielded human remains. The upper-most stratum, layer 1, composed of brownish earth mixed sparsely with whitish *kankar*, did not appear to be human which might have been scoured off (Fig.55). The average thickness of this layer varied between 10 cm. to 23 cm. The majority of the graves, discovered at an average depth of 15 cm. from the present land-surface, were dug into layer 2, varying in thickness between 30 cm. to 38 cm., and composed of brownish earth, white *kankar*, and limestained, stones. Found at an average depth of 46 cm. below surface was brownish disintegrated rock, devoid of any cultural materials. Two graves, Nos. 3 and 7, were cut inside it and are ascribable to the earlier phase. Layer 2 in cases of earlier ones and layer I in cases of later group served as sealing layer. Layer 2 occasionally exposed neolithic sherds, rolled palaeoliths and also in one case calcinated tortoise shell. It may easily be assumed that the second group of burials came into existence when the accumulation to an extent of at least 30 cms. was deposited over the earlier graves. Thus, a thick mantle

originally intervened between the two sets of burials. The time-interval is, however, difficult to determine.

2. Cemetery.

The earliest stratum, as already pointed out, was associated exclusively with extended inhumation type of burial. Both the skeletons (Nos. 5 and 9) are examples of primary, articulated human remains. Grave 3, yielding skeleton No. 5 (Pl. XLB) was found superimposed by Grave 2 of the subsequent period. No disarrangement of bones was observed save the missing of lower mandible with all the teeth. Skeleton 9 (Pl. XLA) in Grave 7 belonged to an adult female. Burial furniture consisted of only pottery in both the cases.

Graves, associated with the upper layer, showed the predominance of secondary burial, preceded by a process of excarnation. Dead bodies might have been exposed in field, pit or platform. The system of re-burial, as practised by the Mundas[1] and the Nicobarese[2] is another type of secondary burial. It is, nevertheless, difficult to ascertain which of the methods was in vogue during the neolithic period of Nagarjunakonda. In some of the skeletons an attempt was made but often wrongly, to put the bones in their original position. This procedure presents complication in determining the character of disposal of the dead.

Grave I exposed two skeletons (Nos. 1 & 4) (Pl. XLIA), one of female and the other of an adult male, showing some amount of intermingling of bones. Two pots were found near the tibia of Skeleton 1, while the other one was bereft of any pottery. One point needs emphasis; it is certain that attempt was made to place the skeletons separately within the same pit. The probable age of the female skeleton at the time of death is determined as 18–25 years; the adult male possibly died at the age of 30. Skeletons 2 and 3 followed almost the same pattern of arrangement. The female member died at the age of 25–30 years but male partner survived double that age. The relationship between the male and female member though very easy to guess, is difficult to establish on scientific grounds. From the facts enumerated above, it may appear that bones of the dead bodies were inhumed at one and the same time inspite of the fact that both of them did not die at the same time. The question now arises where the skeletons was kept in either of the cases till the other partner met with an end? The number of missing bones is not considerable. Moreover, the general absence of animal bones or bones belonging to other individual precludes the possibility of the skeletons being exposed in an open field. They might have been kept in some jar or closed vault or pit till the day of final internment. The other alternative is very similar to the practice of reburial.

That the children were also buried after a period of excarnation is evident from Skeleton 10 of Grave 8, which disclosed the largest number of burial pottery. The other example of (Skeleton No. 8) post-excarnation burial came from layer 2. The continuity of

[1] S. C. Roy, *The Mundas and their country* (Ranchi, 1912).

[2] R. Sewell and B. S. Guha, *Human Remains from Cemetery at Nal, South Baluchinsthan.*

the earlier tradition, as one finds incomplete extended inhumation burial, was represented by skeleton Nos. 6 (Pl. XLIIA) and 7 (Pl. XLIIB), both of them being adult males.

Stratum 2, therefore exposed two different mortuary customs, probably ascribable to two different social groups, if not cultural or racial. It may speak of the arrival of a group although the ceramic industry remained unchanged. An attempt to arrange the excarnated bones in their original anatomical context only tends to suggest modification in the funerary rites of the later group, as a result of contact with a people practising complete burial.

The orientation of the skeletons was invariably north-south, skull being placed approximately to the north. Only pottery, mostly spouted, comprised burial furniture. Skeletons 4 and 8 did not yield any pottery. Generally, pots were kept near the lower half of the dead. In case of Skeleton No. 10 (Pl. XLIB) four spouted vessels were found right upon the femur and tibia. One broken pot, nevertheless, was recovered between the skull and thoraic region. In cases of Skeletons 7 and 9 pots were placed near the ankle. Skeleton 2 had a broken pot to the west of the skull bones. Thus, it may appear that no fixed rule was followed for keeping the pottery near or over the dead, but choice was more for the western or right hand side of the lower half of a skeleton.

3. Infant-Burial.

Only 2 examples of infant-burial remains being kept in urn, came to light from Nagarjunakonda, one each from Site Nos. 46 and 47. The number is definitely meagre in comparison to Brahmagiri which exposed 14 examples.[1] At Nagarjunakonda, fragmentary bones were found in urns, to be buried near or inside the habitational area. The damaged urn from Site 46 brought to view only two teeth of a child, whereas a skull along with all the deciduous teeth came from inside the crushed red-ware urn from Site 47. Either of the urns did not produce any burial furniture. Like Brahmagiri, these were remains of babies below 3 years of age. It is generally presumed that Brahmagiri urn-burials involved primary process but at Nagarjunakonda, they appear more to be of secondary nature. These infant burials may be co-related with the people practising post-excarnation burial. In cases of infants, collected bones were lodged in urns, while the bodies of adults and children were inhumed in burial-pits. Fundamentally, there is no difference in the mode of disposal of the dead between the infants and adults.

4. Solitary Skeleton in a pit.

Pit 8 of Site 46-A produced a well-preserved skeleton in complete articulation. The pit was covered by a cairn heap. The occurrence of a neolithic tool, steatite bead, animal bones and pottery from an ashy deposit below the skeleton may indicate that the pit was in use prior to the disposal of this skeleton. The long, hefty body had been squeezed inside the pit (Pl. XLIII), the diameter of which was not more than 1·47 m. The middle portion

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[1] S. S. Sarkar, Human Skeletal Remains from Brahmagiri, *Bulletin of the Department of Anthropology*, Vol. IX, No. 1, p. 11 (Calcutta, 1960).

of the skeleton was sagging below, whereas the head had been resting against the northern wall of the pit. Some portion of the feet, found in damaged condition due to pressure of stones from above, was possibly protruding out. Here also orientation was from north to south, head pointing north.

It appears to be an unusual burial. Three other pits situated in the same alignment were packed with stones and boulders. The probable hypothesis is that these pits were subsequently deserted by their users after the death of one of their family members. The practice of leaving hearth and home by other occupants consequent on the death of some family member is not uncommon amongst the aborigines of India. The Hill-Pantarams[1] of Central Travancore bury the dead where they died and leave the locality for good. The Veddas[2] too follow almost the same custom.

5. Comparison.

Nagarjunakonda yielded the first regular Cemetery ascribable to neolithic period. Inhumation of the complete skeleton in extended posture was the earliest mortuary custom as preserved in the earliest stratum of the cemetery. It had its continuity in the next phase also though the dominent mode of disposal of the dead was of secondary nature. This change may betray the presence of a distinct culture group that came in contact with the people practising inhumation burial. The new inhabitants had been following different burial-rites but was constrained to modify their custom to a certain extent as a result of contact or intermixture. The basis of this assertion is the existence of graves, where attempts were made to arrange the bones in original anatomical context after a process of excarnation.

The Harappan sites like Harappa[3] (Cemetery R 37), Lothal,[4] Rupar[5] had unearthed extended inhumation burial. The north-south orientation was also followed in all the Harappan sites like Tekwada,[6] Daimabad,[7] and also to a large extent at Nevasa,[8] Brahmagiri[9] excavations had not thrown any light on the burial practices followed in cases of adults. Children were however, interred in extended position with head to the east. Nonetheless, the method of extended inhumation and north-south orientation appear to be very wide spread traits in India, common to many cultures that flourished in different regions. There are only four sites, so far known, where north-south orientation was not practised. They are shahi Tump, Harappa Cemetary H, Brahmagiri and Nal. At Shahi Tump the

[1] J. H. Hutton, *Census of India*, 1931, Vol. I, (Calcutta, 1933) Pt. I & Pt. B.

[2] C. G. Seligman, *The Veddas* (London, 1932).

[3] R. E. M. Wheeler, 'Harappa 1946', *Ancient India*, No. 3 p. 89.

[4] *Indian Archaeology*, 1957-58 p. 12.

[5] *Indian Archaeology*, 1954-55 p. 8

[6] *Indian Archaeology*, 1956-57 pp. 18-19 & pl. XXIIB

[7] *Indian Archaeology*, 1958-59 p. 18

[8] H. D. Sankalia, S. B. Deo, *From History* (to *Prehistory at Nevasa*, Poona, 1954-56) p. 8

[9] S. S. Sarkar, *op. cit.*, p. 11.

body lay on the back in flexed or extended position but the head normally was kept to the west. Cemetary H Stratum II of Harappa revealed a few examples of flexed burial, laid in east-west orientation, head pointing east. The Nal cemetery at South Baluchisthan revealed almost an identical feature. In the extended burials from Nal, the body lay on the left side with bent knees unaccompanied by any grave-goods. These characteristics do not appear to be very common. In one case at Harappa, however, head lay towards the south. Cemetery H represents a heterogeneous population, as revealed by the different types of orientation of the body. The most predominant way, however, is to place the head towards north although east-west and west-east orientations were also noticed. Lothal unveiled one example in which head was placed towards the east. Such minor variations may indicate the presence of people, with different social or spiritual heritage.

Double-burial of Nagarjunakonda has its analogy at Lothal but so far as modes of burials are concerned they are poles apart. One of the skeletons in the double-burial at Lothal lay on its side, a practice common at Nal and Shahi Tump Cemeteries. Further, unlike Nagarjunakonda, the double burial of Lothal is found within a brick lining, also found at Harappa in burial 10 of Cemetery R 37, Nal and, also possibly Nevasa where skeletons were laid in slightly flexed condition in shallow pits lined with lime or in large jars placed horizontally, in pits. These similar features are possibly manifestations of a common spiritual heritage, notwithstanding their differences in the sphere of material culture. The mode and orientation of the burial practices seem less susceptible to quick and frequent changes. These are fairly permanent traits and disagreement in the orientation and method of disposal of the dead may be considered as a real point of difference between different groups of people. It is a spiritual heritage and change in material culture may not affect the funerary or ritualistic belief of a people unless spiritual or cultural domination is markedly felt.

The occurrence of extended inhumation burial and post-excarnation burials side by side in the same Cemetery of Nagarjunakonda has its parallel at Nal. where 'fractional' and complete burial unearthed in one and the same cemetery. Post-excarnation burial of Nagarjunakonda may be an extraneous element in this valley but it is rather difficult to find out its source. An indistinct sub-stratum of this type of disposal of the dead seems to have been preserved in burial-rities of the infants at sites like Tekwada and Nevasa.

In these sites fragmentary bones of infants were possibly lodged in urns. At Brahmagiri dead bodies of babies were "tightly folded to fit into restricted space"—a custom also followed by the people of Cemetery H, Stratum II at Harappa. The strain represented by post-excarnation burial, is dominant at Nagarjunakonda, while at other sites acculturation might have made it extremely indistinct. But there is no reason, whatsoever to try to establish priority of one type over another.

I. HUMAN SKELETAL REMAINS

Ngk. Neo. 1. (Site No. 68).

It belongs to a male individual. The bones of the hind part of the skull, are extant. The pieces had to be joined and restored for obtaining the contour of *norma*

occipitalis. *Fctocranial* as well as *endocranial* surfaces of the extant bones are eroded and pitted.

The *occiput* is moderately rounded and the contour of the *norma occipitalis* is house shaped. The *lambdoid* suture started commencing *synostosis*. External *occipital* protuberance is prominent and the *occipital* crest is well developed.

Ngk. Neo. 3, (Site No. 68). (Pl. XLIV A, B, C.)

The skull is incomplete and belongs to a male. The individual was mature in age approaching senility, which is evidenced by the ossification of *sagittal* and *lambdoidal* sutures. Of the skull, the *calva* is best preserved but there are defects in the facial and temporal region. The entire *sphenoid* bone, most of the orbit and nasal bones are missing. The *alveolar process* of the *maxilla* with all the sixteen teeth is intact. The cusps of the teeth are moderately abraded. The *ectocranial* surface is very much eroded. *Mastoids* are big.

Seen from above the shape of the skull is long and *glabello-superciliary* region is markedly prominent. Forehead is highly receding, which passes back into a slightly convex vertex and slopes evenly down to a rounded *occiput*. Some amount of subnasal *prognathism* is noticeable.

Contour of the *norma occipitalis* is house-shaped having slightly downward converging side walls. *Inion* is very prominent and the muscle attachments in *occipital* region are large.

Mandibular fossae are of medium depth. Prominent *glabello-superciliary* region, big *mastoids* and well developed muscular regions give positive indication that the cranium is that of a male. Good number of measurements could be done on this skull. The skull is *dolichocranic*, length-breadth index being 73. 58. In length, breadth, and horizontal circumference the size exceeds the other Neolithic skulls.

Ngk. Neo. 9 (Site No. 68). (Pl. XLV A, B, C.)

This is a female skull which lacks almost all the facial region and whole of the *basis cranii*. *Vault* sutures are *ossified*, and the skull appears to belong to a fairly old individual. The skull presents feminine features, such as slight *superciliary* ridges, small right *mastoid* and indistinct muscular attachments. The *cranial* contour is ovoid. The frontal bone is evenly sloping and the vertex is well arched which slopes evenly down to a *non-protuberent occiput*. The contour of the *norma occipitalis* is broad and house-shaped.

The skull is *mesocranic* (79.89). The nose is *chamaerrhine*, the index being 55·81. This is the only skull on which both the length and the breadth measurements of nose could be taken.

Ngk. Neo. 10 (Site No. 68).

The skull belongs to a child, represented only by fragmentary pieces of *calva*. The pieces could be joined together, which comprise middle portion of frontal excepting the lateral sides, the right *parietal* and the left *parietal* without its lateral margin. The bone is thin, delicate and light. The thickness of the bone at *parietal* is 3 mm. When examined

from above, the skull gives roughly an ovoid shape. *Parietal* eminences are prominent. *Parietal* arc is 122 mm.

Ngk. Neo. 11 (Site No. 46-A) (Pl. XLVI A, B, C.)

The skull was exhumed in a very damaged condition being badly crushed by earth compression. In spite of heavy damage sustained by the skull the pieces which were somewhat better preserved, could be joined together. The missing part of the skull includes greater part of the base with little of the *squama occipitalis*, part of both the *squama temporalis*, nearly complete nasal bones, small portion of left *maxilla* along with the cheek bone, left *orbit*,, *zygomatic* arches and right *mastoid process*.

The skull undoubtedly belongs to an adult male. Moderately prominent *supra orbital* ridges, the heavy bone structure and the large *mastoids* are masculine features. All the teeth have erupted and the teeth show fair degree of wearing of crown.

Seen from above the head shape is an elongated oval. The frontal eminence are indistinct. In *norma temporalis*, the forehead is inclined sharply and sweeps back in an even curve with the moderately protruberent *occiput*. Subnasal part of the skull is directed forward presenting mild degree of sub-nasal *prognathism*. In *norma facialis*, the face appears to be rather low, the cheek bone on the right side is prominent and the right orbit is rectangular which slopes laterally downward. Palate is short and parabolic. Left *mandibular fossae* is fairly deep.

The skull is *dolichocranic* (71·35).

Mandible is well preserved. *Corpus* is moderately large and *ramus* moderately broad. All the teeth have erupted but the incisors and the left canine are borken at the root. The teeth show considerable attrition. Chin is bilateral and protruding. *Gonial* angles are everted.

Measurement of the mandible:

Bicondylar breadth	120 mm.
Bigonial breadth	108 mm.
Ht. of *mandibular ramus*	68 mm.
Max. breadth of *mandibular ramus* (rt)	42 mm.
Min. breadth of *mandibular ramus* (rt)	35 mm.
Ht. at *mandibular symphasis*	32 mm.
Mandibular length	90 mm.
Mandibular angle	116°

In addition to skull, the skeleton comprises few extremity bones (left *humerus*, right *ulna* and left *radius*), on which measurements could be taken. The measurements are as follows :

	Humerus (left)
Maximum length	345 mm.
Breadth of *proximal epiphysis*	51 mm.

Breadth of *distal epiphysis*	64 mm.
Circumference of the—shaft at the middle	68 mm.
Robusticity index	18·55
	Ulna (right)
Maximum length	300 mm.
Physiological length	271 mm.
Minimum circumference of the *diaphsis*	40 mm.
Robusticity index	13·47

BURIALS FROM NEOLITHIC CEMETERY SITE NO. 68

Grave No. 1

This grave pit yielded two disarticulated adult skeletons Nos. Ngk. Neo. 1 and Ngk. Neo. 4 belonging to opposite sexes. They were laid slightly apart from each other. The grave pit was cut into layer 2 and sealed by layer 1.

Skeleton No. Ngk. Neo. 1

An incomplete and disarticulated skeleton belonging to an adult male was found in a much damaged and disintegrated condition at a depth of ·48 m. below the present surface level. It was laid in north-south direction with the skull placed towards the north. The skull vault was crushed out of shape, while the facial portion was completely missing. Right half of the mandible survived under the fragments of cranial bones. One decomposed *scapula* was placed in the immediate south of the broken cranial bones. Probably, attempt was made to place the bones in an extended fashion. Below the skull region, some long bones were lying parallel to each other.

Ngk. Neo. 4

A badly damaged adult female skeleton, found at a depth of ·54 m. below the present surface level, laid in north-south direction with the head placed towards the north. The skull was very badly damaged and fragmentary in nature. The facial portion of it was completely missing. Some teeth and a fragment of a mandible were lying near the skull region. The skeleton was heavily damaged and most of the bones were missing due to the disturbance caused in the grave pit No. 1.

Grave No. 2

It contained two adult disarticulated skeletons of opposite sexes (Nos. *Ngk. Neo.* 2 and *Ngk. Neo.* 3). They were kept side by side, slightly apart. The pit was cut into layer 2 and sealed by layer 1.

Ngk. Neo. 2

An incomplete and disarticulated adult female skeleton exhumed at a depth of ·23 m. below the present surface level. The skeleton was laid in north-south direction, the skull being placed towards the north. The skull was incomplete, the facial region was completely damaged due to the pressure of earth. A portion of the right half of the *mandible* with

its *molare* was found at the south of the extent *calva.* Further south to this region some decayed fragments of long bones lay without their end parts. *Fibula* was lying east of this. From the skeletal remains, it seems that the burial was badly disturbed earlier, resulting in the damage and missing of some of the bones.

Ngk. Neo. 3

The burial consisted of disarticulated skeleton of fractional burial, the bones of which were arranged in north-south direction. The skull, badly crushed, lay to the north. It was lying on the pit floor on its *norma basalis* facing the south with the vertex pointing upwards. Associated with this skull were a number of other parts of the skeleton. Unfortunately, the remains of this skeleton were much decayed.

Grave No. 3

This pit contained an articulated adult male skeleton, *Ngk Neo.* 5. The pit was cut into layer 3 and sealed by layer 2.

Ngk. Neo. 5

An articulated, more or less complete skeleton belonging to an adult male was found at a depth of 73·7 cms. below the present surface level. The skeleton lay extended in supine position, north-south direction, with the head towards the north. The skeleton was not well preserved. The delicate bones like *scapulae,* ribs and *pelvis* were decayed to a great extent, while mostly the end parts of all the long bones were disintegrated. *Accretion* of distintegrated pebble rocks are observed in the skeleton, in which it was buried.

This grave had been disturbed by grave No. 1 of upper layer 3, resulting in partial damage to this skeleton. Much damage was sustained by the skull, and the *mandible* was missing. The *clavicles* were displaced from their anatomical position and found much below.

Most of the bones were in their anatomical position, some of them in articulation, but had developed cracks all over and occassionally parted.

Skull was incomplete, represented by a greater part of frontal and *parietal* bone and part of the *supra-occipital* region.

Associated finds—spouted vessels.

Grave No. 4

It contained an articulated adult male skeleton, *Ngk. Neo.* 6.

Ngk. Neo. 6

Adult male skeleton. Skull incomplete, represented by part of right *parietal,* broken part of frontal bone, right *temporal* bone with *mastoid process,* fragment of *occipital* bone (region of *occipital protuberance*) and few other small fragments. The other bones were all in a very poor state of preservation.

Grave No. 5

It contained articulated incomplete adult male skeleton, *Ngk. Neo.* 9. The grave pit was cut into layer 2 and sealed by layer 1.

Ngk. Neo. 9

Skull—represented by nearly complete *calva*. Whole of the facial region and *norma basslis* missing. *Mandible*—(a) nearly complete left half with all the three *molars* and second *premolar* in position but the *coronoid process* missing. (b) Fragments of right half with three *molars*. The extremity bones were in a very poor and friable condition, and two *premolars in situ*.

Grave No. 6

It contained one articulated adult male skeleton, *Ngk. Neo.* 8. The pit was cut into layer 2 and sealed by layer 1.

Ngk. Neo. 8

The remains of this skeleton were much decayed and the skull is badly smashed.

Grave No. 7

It contained one articulated female skeleton, *Ngk. Neo.* 7.

Ngk. Neo. 7

A great part of skull is missing, including the whole of the *basis cranii*, whole of the facial region and temporal bones. The rest of the skeleton had disintegrated beyond restoration.

Associated finds—Pot found near right ankle region.

Grave No. 8

It contained one disraticulated adult female skeleton, *Ngk. Neo.* 10.

Ngk. Neo 10

Skull—adult male. Represented by much of the *parietal* bones, part of the frontal and small part of the *occipital* bone. The skeletal remains were in a very bad state of preservation.

2. Habitation Site

Pit No. 8 (site No. 46A)

An articulated adult male skeleton, *Ngk. Neo.* 11, found inside a pit, of 1·52 m. diameter and covered by cairn heap.

Ngk. Neo. 11. (Pl. XLVII A,B,C.)

The skull was incomplete, badly crushed, compressed from above downwards and in a very bad state of preservation. The bony surface was encrusted with deposits of the disintegrated rocky matrix in which the skeleton was buried. The missing parts of the skull include greater part of basicranii, parts of both the *squama temporalis*, nearly complete nasal bones, left *malar* bone, small part of left *maxilla* and the *zygomatic* arches. *Mandible*

was complete. The crowns of all the four *incissors* and left *caning* broken. Of the skeletal remains some of the upper extremity bones were well preserved to permit study.

J. POTTERY

1. Microlithic Culture

(Stone Age—Phase I)

The link between the microlithic and neolithic cultures is available to us from Site 45, which represents clearly a transition stage by yielding more of microliths with pottery and only two specimens of neolithic celts. Before and after this, are respectively pre-pottery microlithic and full-fledged neolithic cultures. The pottery types of this transition period appear to be the forerunners of those found in neolithic levels. But the coarseness of the clay, which is mixed with plenty of sand particles and the crude and hand-made appearance are its distinctive features. Another noteworthy point is that it consists of only dull reddish brown ware, and is comparable with the pottery from the few explored sites in India (associated with microliths alone like Langhnaj, Burzaham Pachmarhi and Beldanga. But this comparison is rather superfluous till some other sites are actually excavated further and the results confirmed. Langhnaj pottery is associated with microliths, and though slightly superior to that of Nagarjunakonda, the quantity is very little and hardly any idea of shapes can be had. An out-turned rim fragment from these seems to be analogous to type Mc 1 here. The fineness of Langhnaj fabric may perhaps be due to the nature of the local clay.

The nearest parallelism is seen in the stratified pottery associated with microliths from Varidyapur in Mayurbhanj district of Orissa. Unfortunately no shapes can be determined here as well from the available sherds, though the gritty texture and ill firing are quite similar to Nagarjunakonda pottery. Latter's coarseness and gritty texture is also due to the nature of the local clay, which could not be fired to a high degree of temperature and thereby leaving a grey to black core section. Majority of this pottery is unslipped but a few instances of light reddish slip and in one case of black slip, are not wanting.

Though the types met with are very few, they seem to be hand-made. The commonest being the urns with flaring or out-turned rims (type Mc. 1) and flattened or foot-ringed bases (types Mc 6 and Mc 7). Special mention may be made of a convex sided deep bowl of mug type with an incurved feature-less rim and a mild ribbing below it, on the exterior (type Mc 4).

Excepting a small sherd having an incised band around the body, decorations or paintings have not been noticed. There are a few cases having encrustation on the surface, while one or two sherds seem to have a coating of lime also. All these types mentioned above continue in the Stone Axe period (Phase II) with the exception of the mug type.

Though the pottery available from this site represents phase I of Neolothic culture of Nagarjunakonda, it would be worth-while to associate it with microliths due to their

predominance. As such the abbreviation used is Mc (microlithic) rather than that of Stone Axe.

Following are the selected types : (Fig. 56.)

Type 1: Fragment of a redware urn-type with out-turned feature-less rim and high neck. Of very coarse fabric, burnt dark grey in section seems to have been treated with a thin red slip on the exterior and interior. Rough analogy comes from Langhnaj[1]; depth 49 cm. from layer 5, S. VI.

Type 1a: A variant also a rim fragment almost similar to the above but does not have so many sand particles in the paste; burnt ashy grey in its section and devoid of any slip; depth 44 cm. from layer 4, S.VI.

Type 2: A small rim fragment akin to the arch type but has a slightly sharpened rim devoid of any slip; depth 41 cm. from layer 4, S. VI.

Type 2a: A variant with an internally thick rim and ill fired, coated with lime on the exterior; depth 41 cm. from layer 4, S. VI.

Type 2b: An internally mildly ledged rim burnt black in its coarse section; depth 49 cm. from layer 5, S. VI. This type along with its variants is found in the neolithic area also.

Type 3: Differs in having an obliquely cut rim; depth 49 cm. from layer 5, S. VI.

Type 4: A small sized deep bowl type, in fragments with slightly incurved externally mildly ribbed rim, convex sides and thick flattened base. Of coarse redware fabric, burnt black in section and coated with lime over a light reddish brown slip; depth 49 cm. from layer 5, S. VI.

Type 4a: Fragment of a vase with a vertical rim; of coarse redware fabric, burnt grey due to under firing, depth 51 cm. from layer 5, S. VI.

Type 4b: Appears to be a fragment of a medium to large sized bowl with a thick flattened rim, which is partly broken, not possible to determine its complete shape, of coarse fabric, devoid of slip, depth 49 cm. from layer 5, S. VI.

Type 5: Fragment possibly of a bowl type with externally collared rim. Of very coarse fabric, burnt grey in section and devoid of slip. Depth 49 cm. from layer 5, S. VI.

Type 6: Fragment of a redware bowl having a ring base. Of coarse fabric, burnt ashy grey in section and has encrustated interior. Depth 61 cm. from layer 5, S. VI.

Type 7: Fragment of a redware bowl having a ring base. Of coarse fabric, burnt ashy grey in section and has encrustated interior. Depth 61 cm. from layer 5, S. VI.

Type 8: Thick flat base of a bowl of very coarse fabric, burnt black in section; depth 49 cm. layer 5, S.VI.

Type 8a: A variant thinner and has a convex base. It is also under-fired. Depth 49 cm. from layer 4-S. VI.

Type 9: Shoulder fragment of an ill-fired bowl of coarse redware with traces of light black slip on both sides. Depth 36 cm. from layer 3, S. VI.

Type 10: Body fragment of a coarse redware jar having incised groove around the body on the exterior. Depth 46 cm. from layer 4, S. VI.

Type 11 : Fragment of a round Jar, of coarse fabric, slightly better fired and treated with light brownish slip on the exterior; probably burnished. Depth 64 cm. from layer 5, S. VI.

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[1] Information from Shri B. B. Lal.

2. Polished Stone Axe Culture

The pottery of this culture is represented by three wares, viz., reddish brown, burnished grey and black slipped.

The reddish brown ware of the preceding phase with almost similar types, besides a few new ones, continues to be in use and the burnished grey ware appears to dominate. The black slipped ware, though least, is also burnished and has very few types. The fabric of the reddish brown ware as a whole is coarse to medium but burnished grey and black slipped wares have comparatively a better finish. The clay of both these wares has been well-levigated and less tempering material has been used in the paste, whereas plenty of sand particles and grit have been mixed in the redware.

All the three wares have been treated with different types of slips, i.e., reddish brown, pale red, pale grey and black either on the exterior or at times on both the sides. Usually the slip is very thin. Some of the pots have a coating of lime on the exterior or interior and occasionally on both sides. No painted pottery has been recovered from any of the trenches. The only decorations met with are incised oblique-slashs, zig-zags and bands around the body. In one instance, finger nail impressions have also been noticed. There are two sherds carrying incised graffiti. A single over-burnt sherd has 'raised' oblique lines made by pressing gently the exterior of the pot, while still wet. Bulk of the pottery has been fired under reducing conditions. Instances of under and over-firing have also been noticed.

It appears from the striation marks on a few of the sherds as if they were made on wheel, although majority of them is hand-made. Most of the rims of the jars have been prepared perhaps on the turn table and then luted with the hand-made body of the neck. That is why they are crude and thick at or below the neck. 'Beating' of the pots is also apparent in many cases near the base where the uneven surface is noticed.

Major types represented in reddish brown ware, are jars with flaring and out-turned rims (type 1), deep bowls with incurved rims (type 16a, 16b), bowls with externally collared rim (type 20), shallow dishes, shallow lid-cum-dishes (types 24 and 25), a lid-cum bowl (type 26) and fragments of pan types with lug handle in the lip form, urn with out-turned rims, medium-sized deep bowl and the mug type of phase I. Type 13 represents a double pot (?). Except dishes, most of the above types are available in the burnished grey ware, of which an incurved thickened rim (49) is unique and does not occur in other wares. A base fragment of dark grey ware has an obliquely pierced perforation in the section of the base, apparently for suspension (57). Only two spouts of grey ware have been recovered from the habitation area, although a number of burnished grey ware spouted vessels have been found in the cemetery. Outstanding type in black-ware is a bowl (39) with punched channel-like lip, roughly analogous to those found at Brahmagiri and Navadatoli.

The frequency of spouted vessels in the cemetery and their rarity in the habitation area may perhaps suggest their being used primarily for ritualistic purposes and as such were kept in the graves. Only two spouts have been recovered from the habitation area whereas more than four spouted vessels come from the graves.

Various forms are indicative of their being put to different uses. Vessels for storing grains, keeping water, cooking, eating and drinking purposes could easily be differentiated.

The jars of type 1 were meant for storage, lipped pans for cooking, shallow dishes might have served as lid as well as eating plates and the tumbler types for drinking.

A number of sherds, oblong in shape and pointed at one end seem to have been reused, as indicated by the rubbing of section on all sides. They appear to have been kept below the pots, which could rest on them. Even then it is rather difficult to speak strictly about their use, as a pot is likely to have been put to different uses. Mention may be made of a spouted miniature pot, perhaps used for rituals only.

The types continued from Phase I of this period have already been described above. It will also be worth-mentioning that only one type of this phase is comparable in form to the one from megalithic pottery of this valley (24 is roughly akin to 9—lid-cum-dish).

One lid-cum-bowl (26) does not occur in megaliths but the type is in abundance in the early historic pottery.

Cemetery area: The whole of the pottery from the cemetery area is of grey ware and mostly burnished. Six complete pots, four of them spouted, have been recovered. They are similar to the pottery from the habitation area, in form and fabric. Usually the pots had been placed on either side of the skeletons. At times these are found near the head or feet as well. But spouted vessels were mostly observed near the hands.

The pottery now seems to be of much wider variety than that of the preceding phase, where only a few plain and simple types are available. Knowledge of the art of making pottery is more advanced. There are certain types which are common to all the sites during this phase all over India and even outside. It may be due to the fact that the easiest forms always emerge first, i.e., the flaring type of rim, shallow lid-cum-dishes, simple dishes, straight sided tumbler and pans, etc.

Most of the analogous types are available at Brahmagiri, Sangankallu, Maski, T. Narsipur, Piklihal, Utnur and a few at Daimabad, Nagada, Bahl, Navadatoli, Gannavaram, Burzahom, Bahurupa, etc. Typologically Piklihal and Tekalkota pottery bears a closer resemblance to Nagarjunakonda pottery of this phase, although the clay of the former two sites is slightly better than that of the latter.

The following are the selected types in red ware: (Habitation area)[1] : (Fig. 57.)

Type 12: A typical neolithic pot urn of medium to large size, with feature-less splayed out rim, concave neck, ribbed shoulder and globular profile. Of coarse fabric, treated with a pale brownish slip and smoothened on the exterior. Rough analogies come from Brahmagiri[2], Maski[3], Sanganakallu[4], and Piklihal[5], and Tekkalkota[6] ; from pit 4, N.IV.

Type 12a: Variant differs from the arch type in having out-curved, externally cut rim and long neck. Of coarse fabric, burnt black in core section and unevenly fired; from layer 6, N.IV.

Type 12b: Variant differs from the above in having a vertically cut rim and longer neck; from layer 3, N. IV.

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[1] A few types have been illustrated in *Ancient India*, Vol. 14, pp. 104 and 105, figures 25 & 26.

[2] *Ancient India*, Vol. 4, p. 226, fig. 19, T. 26.

[3] *Ancient India*, No. 13, p. 46, Fig. 12, T. 21.

[4] Stone Age Culture of Bellary, p. 14, plate VI, type VII.

[5] Information from Dr. Sreenivasachari, (Hyderabad) and now (Piklihal Excavations') pl. 27 fig. 34.

[6] Information from Dr. Sankalia through Dr. Y. D. Sharma.

Type 12c: Variant has slightly wider mouth, a bold rib and expanding profile, from layer 2, N. V.

Type 12d: Variant is of pale red ware and differs from 12 in having more pronounced flaring rim and long vertical neck. Of medium fabric, burnt ashy black in section and coated with lime over a greyish brown surface: from layer 3, N. V.

Type 12e: Variant has externally obliquely cut and grooved rim. Of coarse fabric, burnt grey in section and treated with reddish brown slip on exterior and greyish red on the interior; from pit 5, N. V.

Type 13: Has an excurved feature-less rim and a rib below the globular body. Of coarse fabric, burnished on the exterior and coated with lime on the interior. It appears to be a double pot. Unevenly fired; from pit 5, N. V.

Type 14: Basin fragment (deep-bowl) type of coarse redware with out-turned, internally carinated rim and almost vertical sides. Analogies come from Brahmagiri[1], Maski[2], Piklihal[3]; from pit 3; N. IV.

Type 15: A large sized urn, of coarse reddish brown ware of thick section with a grooved rim and long neck; from pit 4, N. IV.

Type 16: A small sized bowl with feature-less rim and thick base, making an obtuse angle; of medium to coarse fabric, burnt black in section and coated with lime on the interior. Rough analogies come from Brahmagiri[4], Maski[5], Piklihal[6], etc. from pit 28, N. V.

Type 16a: It is of diminutive size, coarse reddish brown ware with incurved feature-less rim; coated with lime internally and burnt grey. Seems to be a lamp type; crude and irregular in section; from layer 3, N.V.

Type 16b: A miniature bowl type of thin reddish brown ware with incurved flattish rim, burnt black in its gritty section; from layer 3; N. IV.

Type 17: A deep bowl of coarse red ware with a closing externally thick rim and widening profile, treated with pale brown slip, sand particles visible on the surface; from layer 1, N.V. Rough analogy comes from Tekkalkota[7].

Type 18: A feature-less closing rim and widening profile, of thick coarse fabric, burnt black in section. Rough analogy comes from Brahmagiri (T. 57) from pit 42, N.V.

Type 19: Fragmentary medium to large-sized deep bowl of coarse redware with incurved, externally thickened and grooved rim and expanding sides, treated with a pale red slip on the exterior. Rough analogy comes from Brahmagiri (T. 60); from pit 27. N.V.

Type 20: A basin type with incurved, externally cordoned rim and vertical sides; of coarse redware, (akin to No. 3 of microlithic pottery); from pit 5, S. VI.

Type 21: Unique type of compressed cylindrical vase of pale brown ware with flattened rim and short midly concave neck. Of medium fabric, burnt grey in section, having semi-burnished exterior. Rough analogy comes from Maski[8]; from pit 28, N.V.

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[1] *Ancient India,* Vol. 4, p. 231, fig. 23, T. 69.
[2] *Ancient India,* Vol. 13, p. 42, fig. 10—2.
[3] *Piklihal Excavations,* pl. 24, fig. 11 f.
[4] *Ancient India,* Vol. 4, p. 231, fig. 23, T. 72.
[5] *Ancient India,* Vol. 13, p. 44, fig. 11-8b.
[6] *Piklihal Excavations*—pl. 24, 8.
[7] Information from Dr. Sankalia through Dr. Y. D. Sharma.
[8] *Ancient India* No. 13, p.44, fig. 11—7.

Type 22: Of coarse redware with incurved sharpened rim, very fragile, though the interior and exterior smoothened. Rough analogies come from Brahmagiri, Maski, Piklihal, Utnur and Tekkalkota; from pit 3, S.IV.

Type 23: A shallow lid-cum-dish of coarse red ware with feature-less rim and flattish base, treated with brownish red slip on the smooth interior; analogies come from Brahmagiri[1], Maski[2], Piklihal[3], Bahurupa; from pit 14; N.V.

Type 24: A pale red ware conical lid with externally obliquely cut rim, carrying a mild groove internally and tapering profile. Of fine fabric, treated with a light pale-brown slip on both sides and also smoothened; from pit 6, N.V.

Type 25: A rare iid of red ware with splayed out droping rim and shallow base; of coarse to medium fabric, roughly burnished exterior below a reddish brown slip and internally coated with lime. from pit 17, N.IV.

Type 26: A unique shallow lid-cum-bowl of red ware with a short incurved feature-less rim and mildy flanged waist; Of coarse to medium fabric, treated with a brownish slip on the smoothened surface. (This type occurs in historical times as well, though missing in Megaliths); from pit 17, N.IV.

Type 27: A miniature lid type of red ware, having a flaring lip and thick flat base. Of coarse fabric, burnished and slipped on either side burnt black on the interior. Analogies come from Sanganakallu;[4] from pit 18, N.IV.

Type 28: A unique red ware shallow bowl or pan type with horizontally flaring lip for gripping and wide tapering profile. Of coarse fabric, burnished and treated with greyish brown slip on the exterior and brown slip on the interior. There might have been a similar lip on the other side also[5], from pit 15, N. V.

Type 28a: A variant smaller and cruder than above and burnt black in section, pale grey exterior and pale brown interior; from pit 15, N. V.

Type 28b: A variant bigger than the arch type. Not carefully made, it has a burnished interior and burnt grey in section, which is also gritty, from pit 6, N. IV.

Type 29: A small spout of red ware having tubular body and thinner ends. Of medium fabric and encrustated appearance; It goes with No.1 of megalithic red ware; from pit 42, N. V.

(Fig. No. 58).

Type 30: A unique type of pale red ware cylindrical mug with externally obliquely cut rim, vertical sides and flat base. Of medium to coarse fabric, burnt grey in section and crudely made; from near the Skeleton No. 6; similar type available in burnished grey ware as well.

Type 30a: Only a part of which extant; of thick section and medium fabric and burnt grey in section carrying a light brown surface; from pit 1, N. V.

Type 31: A huge solid disc base of coarse red ware having a gritty thick section and ill-fired. It has an encrustated interior; from pit 23, N.V.

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[1] *Ancient India,* No. 4, p. 231, fig. 23, T. 73.

[2] *Ancient India,* No. 13, p. 44, fig. 11, T. 11.

[3] *Piklihal Excavations,* pl. 24, 1a.

[4] *Stone Age Cultures of Bellary,* pl. VIII, type XV c.

[5] *Ancient India* No. 13, p. 44, fig. 11—15 appears to have been a similar type.

Type 31a: A variant differing from the arch type in size, burnt black in its section and interior but treated with a brown slip on the burnished exterior; analogies come from Maski[1], Sanganakallu[2] and Piklihal[3]; from pit 3, S.IV.

Type 31b: A variant of pale red ware and differs from the arch type in having a restricted thicker base, of coarse to medium fabric, burnt greenish black in core section. The 'beating' clearly seen near the base, a pale brown slip on both sides; from pit 3, S.IV.

Type 31c: A variant akin to the above though more fragmentary; from pit 3, S.IV.

Type 31d: A variant with a ring base (crudely ribbed by hand) on the exterior; from pit 9, N.IV.

Type 31e: A variant with a prominent disc base with lower half of the globular profile extant. Of medium fabric, burnt black in section and with pale brown slip on either side; from pit 9, N.IV.

Type 32: Also a base fragment of an urn type and uniformly fired. Of medium fabric, treated with a light red slip on both sides; from pit 28, N. V.

Type 32a: A variant differing from the one above in being more coarse, particles of sand and other gritty material made the interior heterogeneous; from layer 2, N. V.

Type 32b: A variant similar to urn type; from layer 2, N. V.

Type 32c: Slightly roundish base; of coarse to medium fabric, burnished and treated with lime on the interior; from layer 2; N. IV.

Type 32d: Fragment of a bowl; of coarse fabric, treated with a greyish brown slip on both sides with a patchy exterior; from layer 2, N IV.

Type 33: A base fragment of medium fabric and thick section, treated with a brown slip; an intentional perforation in the centre; from pit 4a, N. IV.

Following are the selected types in blackware :—

Type 34: Fragment of typical neolithic urn type with horizontally splayed out rim vertical high neck and bulging shoulders, of coarse to medium fabric, treated with a black slip on the burnished exterior. Similar to 12d and 40b. This type occurs at Brahmagiri (T 42), Maski (29 a), Piklihal (27 f); from pit 22, V. N.

Type 35: Belongs to an urn type of burnished blackware and has a flaring and obliquely cut rim (similar to 40 c); from pit 15, N IV.

Type 36: A neck fragment of a medium sized vessel with externally thickened and internally cut rim; of coarse to medium fabric, fairly burnished black slipped exterior and interior. Analogies occur in Tekkalkotta; from layer 3, N. IV.

Type 37: Fragment of a basin (?) having a thickened and grooved rim top, wide mouth and a crude groove around the neck, treated with a black slip on both sides.

Type 37a: Slightly smaller and has a beaked rim, treated with grey slip outside and light black inside. Of coarse fabric, burnished. Akin to 51 and 51a; rom pit 4, N. V.

Type 38: Perhaps a lid type with a feature-less rim and irregular smoothened black exterior and interior, roughly akin to 23 and 55; from layer 2, N. IV.

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[1] *Ancient India,* Vol. 13, p. 46, fig. 12—33.

[2] B. Subba Rao, *Stone Age Cultures of Bellary,* p. 17, pl. VIII, XIII.

[3] *Piklihal Excavations* pl. 25—22a.

Type 39: A unique lipped bowl with a slightly flaring sharpened rim, mildly concave neck, grooved shoulder and rounded body, having on one part of the margin, a punched channel-like slighly tilted lip with thickened edges. A typical specimen of the neolithic pottery assemblage. Of thin black medium fabric, with a fully burnished exterior and interior. Rough analogies come from Navadatoli[1], Brahmagiri[2], and Piklihal[3]; from layer 2, N. IV.

(Fig. No. 59).

Type 40: A neolithic pot-urn with a flaring and externally cut rim, and concave neck with a pale grey slip; from pit 7, N. IV.

Type 40a: Of burnished grey ware and a flaring feature-less rim, of coarse fabric, treated with a pale grey slip; from pit 9, N. IV.

Type 40b: Again of burnished grey ware and having a pronounced and externally sharply cut and splayed out rim and long neck; of medium fabric and treated with the slip of the same clay; from pit 3, N. IV.

Type 40c: A neck fragment of coarse grey ware having a wider mouth, beaked rim and short concave neck; greyish slipped surface; from pit 5, N. IV.

Type 41: A burnished grey-ware fragment of a pot with a flaring grooved rim, of coarse fabric, slipped on either side; analogies come from Sanganakallu[4], Maski[5], Jorwe[6], Brahmagiri[7], Piklihal and Utnur (44); from layer 2, N. V.

Type 42: A decorated rim fragment with everted rim, carrying a row of incised finger nail slashes. Of coarse grey ware, with a smooth and slipped exterior and interior. Analogies come from Sanganakallu[8] and Piklihal (26 f); from pit 4, N. IV.

Type 43: A medium to large sized basin, with everted externally obliquely cut rim, and expanding profile. Of medium fabric, with burnished exterior. Rough analogies come from Brahmagiri[9], Maski[10], and Piklihal[11]; from layer 1, N. IV.

Type 44: A vase of dull grey ware with out-turned obliquely cut rim. Of coarse and fragile fabric, burnt ashy grey in section and seems to be devoid of any slip; found near the skeleton No. 1. This type is abundant in habitation area also. Rough analogies come from Brahmagiri[12] and Maski.[13].

Type 45: Fragment of a small to medium sized jar with splayed out, externally cut and grooved rim. Of medium to fine fabric, burnished on both sides. This type occurs in Red and black as well, from pit 7, N. IV.

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[1] *Indian Archaeology* 1957-58, A Review, p. 33, fig. 18.
[2] *Ancient India*, No. 4, p. 228, fig. 21, T. 44.
[3] *Piklihal Excavations*, pl. 31-51 a.
[4] Subbarao, *ibid*, p. 19, pl. IX, XIX.
[5] *Ancient India*, No. 13, p. 46, fig. 12, T 22.
[6] Sankalia & Deo, p. 45, fig. 3a, 23 b.
[7] *Ancient India* No. 4, p. 230, fig. 22, T 58, T 59.
[8] Subba Rao, *ibid*, pl. VI, Type VII a.
[9] *Ancient India* No. 4, p. 226, fig. 23, T 69.
[10] *Ancient India* No. 13, p. 46, fig. 12, 31.
[11] *Piklihal Excavations* 11, f (pl. 31).
[12] *Ancient India*, No. 4, p. 226, fig. 19, T 27, 29.
[13] *Ancient India*, No. 13, p. 46, fig. 10, 1b.

Type 45a: Also a grey-ware vase with externally thickened rim and thin coarse section; burnished and treated with brownish grey slip on the exterior and black on the interior. A rare type and Akin to Maski 26 (fig. 12); from pit 7, N. IV.

Type 46: Horizontally splayed and externally vertical cut rim, almost straight sides and irregular interior; from pit 10, N. IV.

Type 46a: Differs from above in having sharply cut rim, and ill-fired though smoothened. Analogy comes from Maski (fig. 12-19); from pit 10, N IV.

Type 47: Grey ware deep bowl of large size with slightly inturned and mildly grooved rim. Of medium fabric, treated with light pale grey slip and also smoothened on either side. Uneven firing indicated by the patchy surface. Rough analogies come from Brahmagiri[1], and Piklihal (plate 24-5e); from pit 3, N. V.

Type 47a: Of coarse grey ware with nail headed rim and almost straight sides, black exterior subsequently coated with lime; from layer 1, N. IV.

Type 47b: A thick grooved rim. Of coarse grey fabric with a smoothened surface; from pit 5, N IV.

Type 47c: A smaller variant, of coarse grey ware, also a mildly grooved rim, smooth black interior and smoky exterior; from pit 6, N. IV.

Type 47d: It is a rare type with a bold rib on its side; from pit 6, N. IV.

Type 48: A unique bowl type of burnished dark greyware with a featureless rim and deep profile. Of thin medijm fabric, with a smoothened exterior, rough analogies come, from Brahmagiri[2], Maski[3], Sanganakallu[4], Maheshwar-Navadatoli[5], Piklihal and Tekalkota; from layer 2, N. IV.

Type 48a: Slightly larger than the arch type and of pale grey fabric, interior coated with lime; from pit 5, N. IV.

Type 48b: Coarse grey ware having a sharpened rim and more smoothened appearance than above; treated with light greyish brown slip on the exterior and has a black patch; from pit 5, N. IV.

Type 49: Deep bowl type with internally cut and closing rim; not uniformly fired. Rough analogy comes from Utnur[6]; from pit 16, N. IV.

Type 49a: Again a rim fragment of a jar with prominently closing, internally flanged rim and steep profile. The rim could hold a lid. Of coarse to medium thick grey fabric, with a smoothened surface. Rough analogy comes from Piklihal (1410) in the collection of Hyderabad office; from pit 7, N. IV.

Type 49b: Internally cut and thickened rim and widening profile; of coarse grey fabric, smoothened rim and exterior; akin to Brahmagiri T 57 (fig. 22); from layer 2, N. V.

Type 50: Narrow mouthed pot with high shoulders and grooved rim. Of coarse to medium fabric; analogy comes from Maski[7]; from pit 28, N. V.

Type 51: Fragmentary vase of medium to large size with an externally flanged and grooved rim and expanding profile. Of medium fabric, with a pale grey slip on both sides; from layer 2, N. V.

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[1] *Ancient India*, No. 4, p. 230, fig. 22, T 61.
[2] *ibid*, p. 230, fig. 22, T 57.
[3] *Ancient India* No. 13, p. 44, fig. 117,
[4] *Op. cit.* Pl. VIII, Type XV.
[5] Sankalia & Deo *Op. cit.* pl. 117.
[6] Alluchin *Utnur Excavations* fig. 8-51.
[7] *Ibid*, p. 46, fig. 12—23a.

Type 51a: A variant similar to the arch type but smaller with a prominently beaked rim. Akin to AR 6; from pit No. 26, N. V.

Type 52: Fragment of a unique type of narrow necked pot with externally flanged and grooved rim and high neck; of coarse to medium fabric, with a burnished and slipped exterior. Analogy comes from Piklihal[1]; from layer 2, N. V.

Type 53: Fine grey ware tumbler roughly akin to No. 30, with internally chamferred rim, almost vertical sides and disc base. Paring marks are seen on the exterior; from layer 2, N. IV.

Type 53a: A diminutive deep bowl type coarse grey ware fragment with a flat rim, vertical sides and flat base; Of medium fabric, coated with lime on both sides and semi-burnished irregular appearance; from pit 3, N. IV.

Type 54: Grey ware conical vase with a feature-less rim and tapering profile; with a smoothened and grey slipped surface; analogies come from Brahmagiri[2], Maski[3], Maheshwar-Navadatoli[4], Piklihal[5], Tekkalkota and Utnur[6], (3152 PK 16); from pit 5, N. IV.

Type 54a: Akin to above, but with flat rim top and of pale grey ware. It has a semi-burnished look; from pit 5, N. IV.

Type 55: Fragmentary shallow lid type perhaps also used as a dish, has externally cut rim Analogy occurs in Utnur[7]; from pit 7, N. IV.

Type 56: Shallow lid-cum-dish type of diminutive size with feature-less rim and flat base, Of coarse fabric, treated with a brownish grey slip on the interior, burnished on either side. Roughly akin to No. 27; from pit 1, N. V.

Type 57: Fragment of dull grey ware vase with a flat base, having an obliquely pinched perforation on one side, evidently for suspension. It might be having another perforation on the other side. Of coarse fabric and burnished; treated with a light black slip on the interior only; from layer 2, N V.

Types 57a; and b: Base fragments but do not have any perforations; a type found in a large number; from layer 2, N. V.

57c: Unique specimen of a square base and is treated with a pale grey slip on the exterior ; from pit 26, N. V.

(Fig. No. 60.)

Type 58: Funnel spouted medium-sized vase of pale grey ware with a splayed out rim, high concave neck, round body and restricted, irregular flat base. Of medium fabric, it is burnt black in section. The upper part seems to be wheel-made (?); treated with a grey slip and also burnished; Found near the left pelvis of skeleton No. 5. This type is available in larger number in habitation area too, both in red and black wares. The rough analogies come from Brahmagiri[8], Maski[9], Sanganakellu[10]; from grave No. 3.

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[1] *Piklihal Excavations*, pl. 31—27a.
[2] *Ancient India*, No. 4, p. 226, fig. 19, T 31.
[3] *Ancient India*, No. 13, p. 44, fig. 11, 8.
[4] *Indian Archaeology*, A Review, 1957-58, p. 29, fig. 16.
[5] *Piklihal Excavations*, pl. 24-la and variants.
[6] *Utnur Excavations*, fig. 1—30.
[7] *Ibid.*, fig. 29.
[8] *Ancient India*, Vol. 4, p. 228, fig. 21, T. 46.
[9] *Ancient India*, Vol. 13, p. 46, fig12, 29.
[10] *Stone Age Cultures of Bellary*, p. 16, pl. VII, TX &Xa.

Type 58a: (Cemetery) In fragments, differs from the arch type in having externally cut rim; of coarse grey ware, burnt grey in section. Over the light brownish grey slip, with lime on both sides; found on the right side of skeleton No. 2; from grave No. 2.

Type 58b: (Cemetery) Again in fragments differs from the above, in having a slightly longer funnel spout; treated with pale grey slip and also coated with lime, found near the skeleton No. 1; from grave No. 1.

Type 59: Unique type of spouted grey ware vase of small to medium size with closing thickened and internally cut rim, globular body and restricted flat base. The crude rib formed by beating the base and the waist. Of fine fabric, treated with a brownish grey slip and is indifferently fired. Similar fragments occur in the habitation area also; found near the right side of the pelvis of skeleton No. 5; from grave No. 3.

Type 60: Miniature spouted pot with narrow mouth, elliptical body, having a pinched perforated short spout; of coarse fabric; from pit 28, N. V.

Type 61: Spout fragment of coarse grey-ware, having a tubular body and rounded ends, a semi-burnished exterior with a popular neolithic utilitarian device. Nos. 56 and 57 of cemetery area have similar spouts and rough analogies come from Brahmagiri, Jorwe, Prakash, Nagada, Piklihal and Tekkalkota; from layer 2, N. IV.

Decorated Sherds

The number of sherds recovered from neolithic area is very little. Most of the decorations appear to be incised after firing. The analogies come from many chalcolithic sites like Brahamagiri, Maski etc.

(Fig. No. 60).

Type I: Neck fragment of an urn type with incised uprights, made with a blunt edge. Of coarse fabric. a smaller variant with longer incised strokes, made with a sharp edge; from pit 25, N. V.

Type II: A thick coarse red ware jar fragment burnt grey carries rope design in applique on a thick raised band; from layer 2, N. V.

Type III: Shoulder fragment of an urn type akin to I with a pair of loops only one extant, connected with the bold ribbing around. Of thick coarse reddish brown ware, burnt black, gritty in section, from pit 24, N. V.

Type IV: Shoulder fragment of a straight sided vase of medium size carrying an incised band below the neck, and loops hanging from the above band; from pit 24, N. V.

Type V: Small sherd having a graffiti like X., from pit 25, N. V.

Type VI: A small shoulder fragment of a grey ware vase with prominently incised groove around the body treated with black slip on either side; from pit 18, N. V.

Type VII: Rim fragment of a vase of grey ware with grooves on the exterior. The rim is rolled. Of coarse fabric from pit 23, N. V.

K. NEOLITHS

1. General Observations

The excavation at Nagarjunakonda disclosed one of the finest collections of neoliths in India. It is replete with a variety of types. The surface finds amply corroborate the evidence gleaned from the excavated materials. Axes have greater abundance but at the same time, adzes present a number of types, some of which bear imprints of high workmanship. The unique tool-types from this valley consist of picks with twin working edge, celts with elongated external form, long weeding hoe and side chopper on flake. The first mentioned

group includes one tool, identified as pick-cum-hoe, which has no parallel so far in India. The exact purpose of this implement is not easy to determine, since the supposed pick-end might have as well served the purpose of a chisel. Picks with double pointed end, could have been used as drills. To the list mentioned above, may also be added the type known as shoe-last celt. Many of these implements are accessories for food. Similarly, evolved types of adzes display effective working on wood or bone on a larger scale. The other tool-types, encountered at Nagarjunakonda, are picks with single working edge, chisels, axe-cum-hammers and fabricators. Scrapers associated with this assemblage are included in the next section dealing with flakes.

Neoliths from Nagarjunakonda obviously do not belong to one period. Site 46 represents a very advanced industry, with numerous types and also high frequency of tools. The assemblage, unearthed at Site 45, represents a still earlier phase, characterised by primitive tool-types. Four specimens, out of which one is broken, were recovered from layer 4 of Site 45 in association with a short-blade microlithic industry and crude pale brown hand-made pottery. Axes discovered in this facies typify the earliest neolithic tool, at least so far as the neolithic culture of Nagarjunakonda is concerned. One of them is a fairly big celt, with elliptical medial cross section, crudely chipped pointed butt and straight but narrow cutting edge. It is recognizable from the cortexed surface that the tool was prepared on a rolled nodule having an elliptical transverse section. The pointed butt was obtained not by gradual broadening of the body from pole-end to cutting edge, but by the simple method of chipping. The other specimen, though smaller in size, exhibits identical features. In these specimens, shape and medial cross-section were largely conditioned by the shape of the nodule. Only butt-end and cutting edge were converted into desired form with minimum amount of chipping; the middle portion, nevertheless, was left unaltered. The solitary adze discovered in this assemblage has a plano-convex cross-section but an examination of the butt-end would reveal the existence of anologous crude technique of fabrication. These examples, by virture of their technology also, may be assigned to the earliest neolithic horizon of Nagarjunakonda. They did not occur at other sites of this valley.

The specimen (No. 1) identified here as axe may as well be a digging implement. In that case the earliest neolith from Nagarjunakonda is an agricultural implement rather than a carpenter's tool.

The pointed-butt axe with flat pointed oval section is considered as one of the earliest forms of Bellary neolithic axes.[1] The flattened lenticular type is confined to Phase I A of Brahmagiri.[2] But the inference from Nagarjunakonda evidence is that, tools with sharp or even incipient lateral margins, which differentiate lenticular cross-section (or flat pointed oval) from that of elliptical or oval, are suggestive of an evolved stage. Phases I & II of Nagarjunakonda are bereft of axes with lenticular transverse section. The subsequent phases, nonetheless, show the predominance of the latter type of cross-section. The occurrence of tools with lenticular transverse section possibly presupposes greater skill and deve-

[1] B. Subbarao, *Stone Age Cultures of Bellary*, p. 29.

[2] R. E. M. Wheeler, *Ancient India*, No. 4, p. 247. The cross-section conforms more to sub-rectangular than flattened lenticular.

loped flaking technique, because the shape of the nodule, even if it is multi-planed, is to undergo a complete change. The presence of lateral margins is possibly indicative of all round chipping. The multi-plane nodules having a rectangular cross-section may be the precursor of neoliths with a similar transverse section, which may however, characterise one of its early series. But Nagarjunakonda testifies to the fact that even the implements with rectangular transverse section, (evidently it does not include the developed celts of the Eastern India types), are later intrusions in her neolithic culture. The industry noticed in Salem District seems to have a preponderance of elliptical medial cross-section. Foote observes that in the Shevaroy series the signs of joint planes have largely been obliterated due to extensive and intensive grinding and polishing. According to him the workmanship of Shevaroy industry is much better than that of Bellary.[1] It is not possible to establish the priority of one over the other on the basis of workmanship, but this divergence may, at best, reflect two lines of evolution in the neolithic industry of the peninsular India. Neoliths of Shevaroy series were possibly more dependent on thick nodules with elliptical cross-section, giving rise to thick and roundish specimens. Foote's collection in the Madras Museum, includes celts with triangular and rectangular cross-sections also.

Now, the question arises whether tools with elliptical cross-section should be dated anterior to that with lenticular cross-section or they should be considered as parallel developments either in one region or in different localities. It appears from the evidence of Nagarjunakonda that axe with elliptical cross-section antedates other varieties. Curiously enough, the sudden emergence of various evolved types coincides with the overwhelming frequency of burnished grey ware. The natural corollary seems to be that this particular type of pottery was one of the facets of a developed neolithic tradition that arrived in the valley at a subsequent date. Hence, at the Nagarjunakonda the priority of an axe-type, with elliptical cross-section becomes almost a great probability. In the light of this finding, the Bellary neolithic assemblage, being dominated by axes with lenticular cross-section, may be regarded as a developed facies. The overhelming frequency of tools in Bellary region speaks of an evolved stage of the industry, the beginning of which may be sought in Bellary or elsewhere. A culture similar to Site 45 of Nagarjunakonda has not yet come to light in the Bellary region. But the possibility of its existence there cannot be ruled out. It would be better not to make any generalization regarding the priority of axes having elliptical cross-section over other varieties until the type of Nagarjunakonda evidence repeats elsewhere. Furthermore, it is of utmost importance to review the Bellary and the Salem District neolithic assemblages in the light of recently discovered facts. Frequency of different types of medial cross-section should also find a place in the study to make out a clearer picture of the neolithic tradition or traditions of Deccan, Karnatak and the far South.

The assemblage laid bare at Site 45, nevertheless, suggests that the origin of this industry need not be sought outside the peninsula.[2] The study of Site 45 and Phase II

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[1] R. Bruce Foote, *The Foote's Collection of India Prehistoric and Protohistoric Antiquities—Notes on their Ages and Distribution*, (Madras, 1916) p. 60.

[2] V. D. Krishnaswami, *Presidential Address to the Forty-sixth Indian Science Congress*, Section Anthropology and Archaeology, 1959, p. 139. He is of the opinion that "the Karnatak Polished Axe complex

materials of Nagarjunakonda may tend to suggest that there must have been a stage in the development of the neolithic pattern, when neoliths were rare and the remains were predominantly microlithic, notwithstanding the prevalence of pottery and other associated objects. There should have been a time-gap, theoretically speaking, so far as the evolution of neoliths in the Nagarjunakonda valley is concerned, between the Site 45 culture and Site 46, representing a developed phase. The industry, disclosed at Site 46, is comparable in many respects with the industries uncovered in Bellary and other sites in Karnatak. Practically all the tool-types of this valley have their counterparts in the Bellary neoliths. Let it be said at the outset that the comparison that will follow is, however, handicapped by the absence of statistical data from other sites.

Neoliths from Nagarjunakonda follow five main outlines namely, (i) trapezoidal, (ii) triangular, (iii) conoid, (iv) long ovoid and (v) rectangular. Broadly speaking, pointed or narrow-but-thin-butted axes conform to either triangular of conoid external forms, trapezoidal or long ovoid shapes have their butt-ends blunted or rounded. Truncated butts are confined to rectangular form. This type has been identical as axe-cum-hammer, so common in the sites of Karnatak and the far South. The frequency of pointed and thin butts on one hand and rounded or blunted butts on the other appears to be equal at Nagarjunakonda. It is, therefore, apparent that pointed butt[1] is not the dominant feature of this industry. Blunt-butted axe occurs in Bellery also but its frequency in relation to pointed butt, is yet to be worked out. Neoliths of Salem District also show both the types of butt-ends. The variation in the shape of the butt may be functional rather than cultural.

Elongated trapezoidal and triangular forms, Worman's types 2 and 3, are widely distributed in east, central and South India. Nagarjunakonda is, therefore, not an exception to this rule. Trapezoidal external form accounted for the maximum number of tools. Triangular shapes dominate the Bellary neolith although trapezoidal forms do occur there too in appreciable quantity. At Nagarjunakonda, it forms 30% of the total number of axes discovered. It will be evident from the Table that trapezoidal external form follows four different cross-sections, namely, elliptical, lenticular, plano-convex and triangular. Conoid shapes have invariably elliptical transverse section, while rhombiodal cross-section is restricted to triangular outline. Similarly, rectangular-cross-section is observed only in the triangular external form. Conversely speaking, triangular shapes follow either rectangular or rhomboidal cross-section. Long ovoid shapes are confined to lenticular cross-section; the predominance of the same cross-section is noticed in rectangular or trapezoidal shapes also.

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is to be deemed a local industry developed on the soil, as it emanates from a crude post-Palaeolithic (microlithic) flake industry of the hunting stage when axes were rare". He also opines that the origin of the polished axe culture of Karnatak should not be looked for, in the Indus Valley or in the Middle East and Iran as conjectured by Allchin.

There is a vital difference between the pointed butt and thin-but-pointed butt. In the former, two lateral margins and both surfaces join in a vertex, whereas in case of latter, the apex is U-shaped. It is not unlikely that different types of butt developed as a reaction to some necessity or functional usage. The pointed butt-ends might have been used for drilling operations.

[1] D. Sen & Uma Chaturvedi, *op. cit.*, p. 182.

Celts with elongated external form, type 3 of Nagarjunakonda, occur in the surface collection of Salem and Bellary also. Sighbhum[1] has yielded "a somewhat large (about 20 cm.) heavy type approaching Worman's type 5. Long weeding hoes with an average length of 18 cm., are not reported so far from other sites. Picks with twin working edge are found at Nevasa and sites in Raichur District, but pick-cum-hoe of Nagarjunakonda is unique in type as well as in high workmanship. Shoe-last, celts are, however, common to Bellary and Nagarjunakonda. Thus Nagarjunakonda neoliths like Bellary, present not only carpenter's tool but also implements pertaining to tillage operations. Side chopper on flake has its counterpart in Bellary also.[2] It appears that the developed neolithic phase of Nagarjunakonda is only a part of a widely diffused trait, traces of which, at least, so far as their neolithic tool-industry is concerned, are discernible at various sites like Bellary, Piklihal, Maski, Brahmagiri, Singhbhum, Banda etc.

2. Neoliths from Excavation

It will be apparent from the accompanying Table that Site 46 yielded the maximum number of neolithic tools (77·98%) from strata as well as from pits. About 50% of the total number from this site came from stratum 2 the actual neolithic horizon. Pits revealed about 37% of the total. This site is rich, not only in number of tools but also in their variety. All the 10 types were recovered from Site 46 whereas Sites 45, 46-A and 47 brought to light only types 2, 1 and 4 respectively. Site 46 culture seems to indicate a sudden influx in the tool-types, and this factor seems to preclude the possibility of evolution of cruder types of implements into finer varieties. The statistical analysis, points to an extraneous element in the assemblage of Site 46. Before the arrival of this element the neoliths comprised axe and adze only.

Quite a good percentage of tools was present in layer 2 of Site 47. Some of the specialized tools like small adze, pick-cum-hoe came from this stratum. Layer (1) of Site 46 was also found to have been associated with a good number of tools. The presence of some of the evolved types in layer (1) of Site 46 and layer (2) of Site 47 may be an indication of the continuity of neolithic occupation in the valley. Nevertheless, the frequency of tools, either finished, unfinished or broken, clearly indicates stratum (2) as the actual neolithic horizon of Site 46.

3. Unfinished Tools & Techniques of Manufacture

Unfinished tools from excavation form 9·17% of the total collection. The preponderance of doleritic flakes and proximity to raw materials, coupled with the evidence of good percentage of unfinished tools, naturally suggest that these sites were the manufacturing centres of this industry which may not be considered as extensive or intensive in character, but must be adequate for the settlement of a small community, self-sufficient in the manufacture of tools and implements of their own (Fig. 61).

[1] D. Sen & Uma Chaturvedi, *op. cit.* p. 182.

[2] Nos. 826-A & 630 of the Foote's Collection.

TABLE II

Classification & Distribution of Neoliths from Excavation

Name of Site	Finished Tools										Un-finished	Broken (not determinable)	Total
	Axe	Adze	Elongated celts	Shoe-last celts	Weeding hoe	pick	Chisel	Axe-cum-hammer	Side Chopper	Fabricator			
Site 45													
Layer 1	—	—	—	—	—	—	—	—	—	—	1	=1	
Layer 4	2	1	—	—	—	—	—	—	—	—	—	1=4	(4·58%) 5
Site 46													
Layer 1	4	2	1	2	—	—	—	—	—	—	1	1=11	
Layer 2	14	1	3	—	2	4	3	1	1	2	5	7=43	
Pit	7	5	3	3	—	4	2	1	—	1	—	5=31	(77·98%) 85
Site 46-A													
Layer 3	2	—	—	—	—	—	—	—	—	—	1	=3	
Pit	1	—									—	=1	(3·68 %) 4
Site 47													
Layer 2	2	1				1					2	— —=6	
Layer 3	3	—				1					—	1=5	
Pit	2	1				—		1			—	— — —=4	(13·76%) 15
Total	37	11	7	5	2	10	5	3	1	3	10	15=	109
Percentage	33·94%	10·18%	6·44%	4·58%	1·83%	9·17%	4·58%	2.75%	0·91%	2·75%	9·17%	13·76%	

Tools were generally fashioned out of roundish, oblong or multi-plane doleritic rocks, bluish or greenish in colour. Such pieces were found scattered all over the surface near the trappoid dyke. It is not unlikely that multi-plane nodules, with a wide but thin naturally formed curving edge, might also have been employed as tools. One such specimen (not illustrated) was discovered in a pit of Site 46-A. A similar piece from surface (No. 85) has only the working edge chipped for some specific function. No. 78 from layer (2) of Site 46 still retains one of its high ridged and cortexed surface, though the other side is completely chipped off by means of primary flaking. Majority of the unfinished specimens show incomplete cutting edge while the butt has already assumed a required shape, the typical example (No. 5) of which came from layer 3 of Site 46-A. A few partially chipped or unfinished tools demonstrate clearly that rolled oblong nodules having elliptical cross-section were also selected for the preparation of axes or other implements. No. 4, with top part slightly chipped and discovered from Layer (2) of Site 46 is a typical example.

Some of the pits yielded large chunks of doleritic stone. Flakes have been taken out from such lumps also. Thus, the neolithic industry of the valley was not merely dependent on nodules; quite a good percentage of tools was wrought on flakes as well.

There are three crudely chipped axes with high ridge and roughly triangular cross-section, ventral surface being flattish. No. 9, from the uppermost stratum of Site, 46, is in the early stage of manufacture. The pointed butt and the semi-circular cutting edge are achieved by means of stepped flaking; cortexed surface still remains. It simulates almost a hand-axe. The long ovoid shape of No. 16 is obtained by bold and alternate flakings. This specimen was also from Site 46. The flaking technique of Site 45 is too simple in comparison to that of Site 46. In the former site the shape and cross-section are conditioned by the original nodule. On the other hand the developed technique of the latter site were directed to fashion a tool of required, if not standard, shape.

Tools recovered from excavation show various stages of manufacture, but without evolutionary significance whatsoever. The cutting edge in most cases was bifacially polished and only a few examples, it extends beyond the cutting edge, even if the particular specimen was ground or polished. The general characteristic feature of tools from this place, so far as stages of manufacture are concerned, are the combination of three stages, namely chippings, grinding and polishing in one tool—generally cutting edge polished, body ground, lateral margins chipped. Celts with partially chipped body also occur in this complex. No indubitable evidence of the method of grinding or polishing was met with in course of excavation or exploration "Grooves worn deep into the rock surface by grinding their celts" discovered on the North Hill, Bellary by Foote did not occur in this valley. High crests or ridges formed as a result of preliminary flakings might have been dressed up by hammerstones or fabricators, comparatively lighter in weight. A few whetstones were discovered in excavation but whether they were meant for grinding or polishing of celts, is only a matter of conjecture.

Generally fine-grained doleritic basalt lumps were employed for making good tools. Dileorite and quartzite accounted for a very little quantity. Creamy Jade-greenish patina is observed in a few cases. But the majority of the tools are stained yellowish brown or reddish, possibly through absorbing iron compounds from pulverized rocky deposit. Such 'porousskin' or patina offers absolutely no criterion for determining the age of an artefact. Tools recovered in excavation are quite fresh and in good stage of preservation.

4. Measurements of Neoliths from Excavation

A few interesting features may be gleaned from the measurements of axes, and the proportion between the length and the width of the cutting edge. The neolithic people here had a preference for the length-group of 11 cm. (11 cm. to 11·9 cm.), in which 13 specimens fall. There are 1, 5, 4, 2, 2, 3 and 1 specimens in length-groups of 7, 8, 9, 10, 12, 13 and 15 cm. respectively. Axes having more than 12 cm. in length are cruder in workmanship. So far as the width of the cutting edge is concerned there are 12 specimens in the width-group of 6 cm. (6 cm. to 6·9 cm.). On the other hand 4, 8, 9 and 1 specimens fall in the width-groups of 3, 4, 5 and 7 cm. respectively. In actual handiwork much of precision is not

expected and each tool differs in minor details from the other. Though the axes were made without any rigid standard of proportion between the cutting edge and the length, a tendency to keep the length more than one and a half times to almost double the cutting edge can be noticed. Nos. 1 and 108 from Phase I are, however, exceptions. The ratio of these two specimens is in conformity with that of the celts with elongated external form or long weeding hoes. Possibly the said examples were not cutting implements despite the fact that they are included in axe-group in the present classification. A regrouping on the basis of the measurements and proportion between the cutting edge and length is not impossible but it has been avoided here since the classification on these lines needs corroboration and further verification from other neolithic industries. Furthermore, it is necessary to find out this ratio from the measurements of specimens from various parts of the country.

It is not unlikely that the utility of a tool might also have been subservient to this proportion between the width of the cutting edge and the maximum length. Nos. 1 and 108 seem to be either digging implements or cruder variety of axes with a disproportionate body, characteristic of that early phase. In case the former hypothesis is correct the earliest neolithic phase of Nagarjunakonda knew the use of digging implements and not the axe. This point need not be pressed hard in view of the meagreness of data at our disposal. But theoretically speaking, the priority of rudimentary tillage operation over carpentry may easily be postulated.

The measurments of digging implements from Nagarjunakonda generally reveal a ratio of 1:3 or 1:2·5, indicating that they have a greater length compared to the cutting edge. The specimens, which are identified as adzes, have their length generally double the cutting edge or very slightly less. Adzes show a preference in the length-group of 9 cm. In length they range between 7·3 cm. to 11 cm. The width of the cutting edge varies between 2·7 cm. to 4·8 cm. the maximum tools being in the width-group of 4 cm.

Wherever possible the measurements (given in centimetres) of the length and width of the cutting edge, along with their ratio, making the cutting edge a unit, are shown against the illustrated specimens in Section 5 of this sub-chapter. The arithmetical mean of the ratios for thirty four samples of axes is 1·99, whereas the median is 1·92. In case of eight samples of adzes the artithmetical mean and the median are 2·095 and 1·97 respectively.

5. Classification

Neoliths from Nagarjunakonda may be divided into 10 main types, namely, (1), axe, (2) adze, (3) celt with elongated external form, (4) shoe-last celt, (5) long weeding hoe, (6) pick, (7) chisel, (8) axe-cum-hammer, (9) side chopper on flake and (10) fabricator. Axes, classified mainly according to medial cross-section, is further sub-divided according to external form and shape of the butt. Broadly speaking, they show 7 sub-types, so far as medial cross-section is concerned. In majority of cases workmanship is crude and as such the medial cross-section conforms only to a rough geometric outline (Fig. 62).

TABLE III

Classification of Axes from Nagarjunakonda

Name of Site	External from						Medial cross-section							Shape of butt					
	Trapezoidal	Triangular	Conoidal	Long ovoidal	Rectangular	Total	Elliptical or Circular	Lenticular	Rhomboidal	Rectangular	Triangular	Planoconvex	Total	Pointed	Narrow & thin	Rounded	Blunted	Truncated	Total
Site 45	x	x	2	x	x	= 2	2	x	x	x	x	x	= 2	2	x	x	x	x	= 2
Site 46	14	7	1	3	2	=27	4	10	2	5	5	1	=27	4	5	1	13	2	=25
Site 46-A	x	1	1	1	x	= 3	1	1	x	1	x	x	= 3	1	x	1	x	x	= 2
Site 47	2	4	1	x	1	= 8	1	2	2	2	2	x	= 8	4	1	1	1	1	= 8
Total	16	12	5	4	3	=40	8	13	4	8	5	2	=40	11	6	3	14	3	=37
Percentage	40	30	12·5	10	7·5		20	32·5	10	20	12·5	5		29·72	16·21	8·16	37·83	8·10	

Type I (axes):

a. Elliptical cross-section

This sub-type may be distinguished from other ones as having generally an unworked middle portion; the lateral margin is absent in practically all the specimens. The original shape of the nodule is least altered in majority of cases. In some examples cross-section tends more towards circular outline. They have either a conoid or trapezoidal external form.

(i) *Conoid external form* with pointed-butt, has either a convex or straight cutting edge. No. 1 came from the earliest level, and is also cruder in workmanship. The pointed-butt was achieved by simple chipping. Similarly, the straight and sharp cutting edge was obtained by sharp convergence of both the surfaces. Cortexy surface is retained in patches. This may be considered, in view of its association with a predominantly microlithic assemblage, as one of the earliest tool-types from Nagarjunakonda. No. 5, with a worn out cutting edge, is similar to above and was recovered from the same site. No. 7 is also crude in workmanship, with a rounded butt and straight cutting edge, the latter was formed by the abrupt convergence of the dorsal surface with the ventral one. Other two specimens (Nos. 2 & 3) are typical examples of pointed butt axe, having an elliptical cross-section, polished cutting edge, besides ground body. These two examples seem to be a developed type which does not occur in the early neolithic phases of Nagarjunakonda. No. 2 has a re-chipped body. Both the specimens are symmetrical in shape.

Plate No 8. XLVIII & XLIX & Fig. 63.

No.1	Site 45/12-B,	Layer (4)	4·3 cm. × 15·4 cm.	=1:3·58
No.2	Site 47/339D,	Layer (3)	6·3 cm. × 11·2 cm.	=1:1·77
No.3	Site 46/362C,	Layer (2)	5·8 cm. × 12.4 cm.	=1:2·14
No.5	Site 46-A/383-E,	Layer (3)	3·8 cm. × 7·7 cm.	=1:2·02
No.7	Site 45/12-B,	Layer (4)	3·7 cm. × 11·0 cm.	=1:2·97

(ii) *Trapezoidal external form* has invariably blunted-butt and straight cutting edge. No. 4 is a crude specimen having a ground body. The cutting edge was formed by the abrupt convergence of two surfaces No. 6 is similar to No. 4. No. 8 has a rechipped cutting edge; a flake was also removed from the butt-end.

Plate Nos. XLVIII & XLIX & Fig. 63

No.4	Site 46/362-C_4	Layer	(2)	3·6 cm. × 10·8 cm.	=1:3·00
No.6	Site 46/382-C_4	Layer	(2)	4·2 cm. × 8·5 cm.	=1:2·02
No.8	Site 46/362-E_4	Layer	(2)	6·5 cm. × 9·7 cm.	=1:1·49

b. Lenticular Cross-Section

They are either trapezoidal or long ovoid in shape, with straight and convex cutting edges respectively. Axes with lenticular cross-section differ from those with elliptical cross-section in having sharp or sometimes incipient, lateral margins. This type does not occur in Phases I & II of Nagarjunakonda.

(i) *Trapezoidal external form* has generally a blunted-butt and straight or slightly convex cutting edge. It is generally long and narrow in shape. The polishing extends even on the body but not much care is given to smoothen the chipped lateral margins. No. 12 is a beautiful specimen, with a nice groove at butt-end, presumably for hafting; both the dorsal and ventral surfaces converge mildly to produce a sharp cutting edge. No. 14 is a broken specimen but it is quite thin in section Nos. 9, 10 and 11 are, more or less, of the same type having a long and narrow body. No. 9 is an intact specimen, whereas, Nos. 10 and 11 have their butt-ends damaged. The broken butt-ends in a number of specimens from Nagarjunakonda may suggest that they were also put to some use.

Plate Nos. XLIX & L & Fig. 63

9. Site	46/382-D_4	Layer(1)	4·4 cm. × 11·3 cm.	=1:2·56
10. ,,	46/362-B_4	Pit 9	4·9 cm. × 11·5 cm.	=1:2·34
11. ,,	46/362-C_4	Pit 47	6·3 cm. × 12·0 cm.	=1:1·90
12. ,,	47/359-D_1	Pit 9A	4·3 cm. × 0·1 cm.	=1:1·88
13. ,,	46/363-C_3	Layer	6·0 cm. × 8·9 cm.	=1:1·48
14. ,,	46/342-C_4	Pit 52(1)	Broken upper part	

(ii) *Long ovoid external form* has almost semi-circular cutting edge. Butt-end is, however, either thin V-shaped or blunted. This type is confined only in Phases III & IV. No. 16 with deep convex or semi-circular cutting edge is thicker at the butt-end. No. 15 is comparatively shorter in length, No. 18 is an example of thin lenticular cross-section having an entirely ground body; butt-end is slightly damaged. No. 17 has an asymmetrical and chipped body with a thin but pointed-butt; a groove on the butt-end is meant possibly for hafting. It has a deep-convex oblique cutting edge. Semi-circular cutting edge of Nos. 16 and 15 is comparable with that some of Banda and Raichur Districts surface examples, now in the Indian Museum, Calcutta and the Hyderabad Museum respectively.

Plate No. L & Fig. 63

15. Site 46-A/3-D, Pit 8	6·5 cm. × 12.6 cm.	=1:2·00
16. „ 46/362-C, Layer(2)	6·2 cm. × 13·4 cm.	=1:2·16
17. „ 46/363-A, Layer(2)	6·0 cm. × 13·2 cm.	=1:2·20
18. „ 46/362-B, Pit 16A	5·5 cm. × 11·6 cm.	=1:2·10

c. Rhomboidal Cross-section

These tools are conspicuous in having mid-ribs on both the surfaces and have clear lateral margins. Triangular in external form, they have straight or slightly convexd cutting edge, thin or pointed butt and generally polished cutting edge. No. 21, however was entirely ground. Its butt-end was also broken like No. 19. No. 22 possesses a pointed-butt whereas No 20, the most beautiful example of this group, has a thin U-shape butt-end. Similar type, now in the Indian Museum, was found from North Hill, Bellary.[1] Two surface specimens from Piklihal, also in the Indian Museum, have rhomboidal cross-section. This type, collected from Maski and other sites in Raichur District, is found in the exhibits of the Hyderabad Museum. Foote's collection in the Madras Museum also contains specimens with rhomboidal cross-section.

Plate Nos. L & LI & Fig. 63

No.19	Site 46/363-B, Layer (2)	5·5 cm.	× 9·9 cm.	=1:1·80
No.20	„ 47/359-D, Layer (3)	6·5 cm.	× 9·9 cm.	=1:1·36
No.21	„ 47/359-D, Layer (2)	6·0 cm.	× 11·6 cm.	=1:1·93
No.22	„ 46/362-C, Layer (2)	5·1 cm.	× 11·3 cm.	=1:2·10

d. Rectangular cross-section

This sub-type may be distinguished from other ones in having broad sides, which may be either straight or slightly convex, and flat dorsal as well as ventral surfaces. It has a triangular external form and convex cutting edge. Axes with semi-rectangular section are found in Bellary and also at Amaravati in Guntur District.[2] The best specimen from Nagarjunakonda and possibly a very developed example of this sub-group is No. 23. It has, more or less, parallelogramatic cross-section, with splayed out cutting edge, formed by the sharp bevelling of the upper surface. It has a blunted-butt. No. 26, another evolved specimen, very small and slightly damaged, has a thin U-shaped butt and parallelogramatic medial cross-section. No. 24, slightly cruder than the above mentioned specimens had a ground body, flattish surfaces and convex cutting edge. One of the sides of No. 25 is damaged but, the butt seems to be intentionally blunted. No. 29 is a long axe-head with splayed out cutting edge and concave undersurface. It has a chipped body but a polished cutting edge. In this specimen surfaces converge sharply in an acute angle to give a nice cutting edge. No. 27 has a convex oblique cutting edge which tends to splay out on one side. Its under surface is slightly concave and each margin near the butt-end bears a horizontal groove, suggestive of adze-hafting.

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[1] J. Coggin Brown: *Catalogue of Prehistoric Antiquities in the Indian Museum*, p. 72, pl. VI, fig. 14.

[2] B. Subbarao: *Stone Age Cultures of Bellary*, (Poona, 1948) p. 33. Also see '*A Hand book of the Indian Prehistoric Antiquities. Prince of Wales Museum, Bombay*', by S. N. Chakravarty, pl. II, 1950.

Plate Nos. LI & LII & Fig. 64 & 65

23. Site 46/362-C_2, Layer(2)	7·3 cm. × 11·3 cm.	=1:1·54
24. „ 36/382-C_1, Pit-40	4·0 cm. × 6·1 cm.	=1:1·52
25. „ 46/382-C_1, Pit 33	4·9 cm. × 3·4 cm.	=1:1·71
26. „ 46/382-E_4, Layer(1)	3·5 cm. × 5·9 cm.	=1:1·40
27. „ 47/339-E_1, Layer(3)	5·1 cm. × 10·7 cm.	=1:2·09
29. „ 47/359-E_2, Pit-6	6·8 cm. × 13·6 cm.	=1:2·00

e. Plano-convex cross-sction

Trapezoidal in external form with rounded or blunted-butt, the cutting edge is obtained by bevelling the upper surface. It has a deep convex longitudinal profile. In both the case (Nos. 30 & 31) butt is chipped and has grooves on the lateral margin to facilitate hafting or easy grip. Undersurface in both cases is slightly concave. A groove near the cutting edge in the undersurface of No. 30 noticeable. If it is not accidental, it appears that it was meant for extra-support to the blade, which should be at right angles to the shaft as in the case of an adze.

Plate No. LII & Fig. 65

30. Site 46/362C_2, Layer(2)	6·5 cm. × 11·5 cm.	=1:1·76
31. „ 47/360-E_4, Layer(2)	5·5 cm. × 11·8 cm.	=1:2·14

f. Triangular cross-section

These tools have generally trapezoidal external form, narrow or blunted-butt, convex or convex-oblique cutting edge. Except No. 32, which has a polished body but rechipped cutting edge, all other specimens were either ground or chipped. Nos. 34 & 35 were made on brownish quartzite No. 33 has an incipient handle. Needless to say, all the tools have flattish undersurface. Cutting edge in all cases, except, No. 36, was formed by the bevelling of upper surface. Tools with similar cross-section are in Foote's Collection in the Madras Museum[1] but they occur in limited quantity in Singhbhum.[2] This type of tool is confined only to the most developed site of Nagarjunakonda.

Plate No. LII & Fig. 65

32. Site 46/362-C_2, Layer(2)	5·1 × 9·5	=1:1·86
33. Site 46/362-B_1, Pit-1	5·2 × 11·0	=1:2·11
34. Site 46/362-B_2, Layer(2)	4·8 × 11·4	=1:2·37
35. Site 46/382-B_2, Layer(2)	5·5 × 8·8	=1:1·60
36. Site 46(362-C_2, Layer(2)	6·2 × 11·6	=1:1·87

[1] No. 2·102, 105, 108 from Salem District.

[2] D. Sen & Uma Chaturvedi; Further Studies in Singhbhum, Neolithic Typlogy, *Man in India*, Vol. 38, No. 3, 1958, p. 179.

Type-2 (adzes):

Adze may be divided according to medial cross-section into three sub-ypes, namely (a) adze with plano-convex cross-section, (b) triangular cross-section and (c) rectangular cross-section. Axes with triangular or palno-convex cross-section might also have been used as adzes. The earliest adze-type, No. 39 from Nagarjunakonda, displays plano-convex cross section with crudely chipped pointed butt. It came from Site 45, representing the earliest neolithic assemblage of this valley. So far as the external form is concerned adze may be divided into two sub-types, (i) triangular and (ii) ovaloid. It may be either long-and-narrow or short-and-broad. Besides pointed-butt, the adzes from Nagarjunakonda show thin U-shaped butt-ends also. Cutting edges are either straight, convex or oblique-convex.

a. Plano-convex cross-section

This is the most dominant type of adze from Nagarjunakonda. No. 39 is ovoid in shape and has a slightly convex cutting edge. It is entirely a chipped specimen having a crude pointed-butt. The depression near the butt-end is possibly meant for hafting. No. 44 has a triangular external form and an almost straight cutting edge but it is polished. It has a pointed-butt, which was broken in the case of No. 43. The later has a convex longitudinal profile. The specimens described above belong to short and broad variety. No. 37 is a complete example of long and narrow variety, with convex longitudinal profile and straight cutting edge, which was polished and bevelled. It has a chipped narrowing butt. No. 42 has a convex cutting edge but upper part is missing. No. 47 has only chipped edges, upper surface being cortexed.

Plate No. LIII, LIV & LV & Figs. 65 & 66

37. Site 46/362-C_2, Pit 46	2·7 cm. × 9·5 cm.	=1:3·51
39. Site 45/12-B_2, Layer(4)	3·6 cm. × 7·4 cm.	=1:2·05
42. Site 46/362-D_2, Layer(1)	2·7 cm. × upper part broken.	
43. Site 46/362-A_3, Pit 28	3·3 × 7·2 cm.	=1:1·67
44. Site 46/362-A_2, Pit IC	4·3 cm. × 8·5 cm.	=1:1·93
47. Site 46/362-D_2, Layer(1)	3·7 cm. × 9·9 cm.	=1:2·67

b. Triangular cross-section

There are only two examples in this sub-type. But No. 41 is the most intact and beautiful specimen from Nagarjunakonda. It has a very sharp and straight cutting edge, bevelled from both the surfaces. No 46 with a triangular external form, has a polished covex-oblique cutting edge. Its undersurface is pronouncedly concave. A depression on one of the lateral margins is possibly for hafting.

Plate. Nos. LIII & LIV & Figs. 64 & 65

41. Site 46/363-A_3 Pit 44	2·8 cm. × 7·1 cm.	=1:2·53
46. Site 46/362-B_2 Layer(2)	4·9 cm. × 9·7 cm.	=1:1·97

c. Rectangular cross-section

No. 38, with a thin butt has a deep convex cutting edge, bevelled from the bottom. No. 40 has a pointed-butt and almost straight cutting edge, formed by sharp convergence of the uppersurface with the ventral one. No. 45 though slightly cruder and differs in having a straight cutting edge, is similar to No. 38.

Plate Nos. LIII & LIV & Fig. 64

38. Site 47/340-A, Layer(2) 5·0 cm. × 11·1 cm. =1:2·2
40. Site 47/360-B, Pit 10 3·4 cm. × 6·7 cm. =1:1·97
45. Site 46/362-B, Pit 17 4·1 cm. × 10·0 cm. =1:2·4

Type 3 (Celts with elongated external form):

There are 7 specimens in this group, out of which 4 are broken. These elongated tools, with an average length of 15·72 cm., have bi-convex or lenticular or rhomboidal cross-sections but undersurface is comparatively flattish. No. 48 is the largest of this group; its cutting edge is convex-oblique. The butt-end of this tool is intentionally made narrow and thin. This is the case with No. 49 also but it has almost a straight cutting edge Nos. 50 & 51 have broken upper parts No. 52 and 53 were recovered from the same locus No. 52 has a rhomboidal cross-section. It appears from the shape of cutting edge of Nos. 48 and 52 and also from the abnormal length of this group of tools that possibly they were used as hoes or digging implements.

Plate No. LV & Figs. 65 & 66

No.48 Site 46/362-B, Layer(2) 5·6 × 18·5 =1:3·12
No.49 Site 46/362-C, Layer(2) 5·8 × 14·6 =1:2·34
No.50 Site 47/360-E, Layer(2) broken.
No.51 Site 46/382-C, Layer(2) broken.
No.52 Site 46/363-A, Pit 28 6·6 × 14·8 =1:2·24
No.53 Site 46/363-A, Pit 28 6·0 × 15·0 =1:2·25

Type 4 (shoe-last celt):

Excavation did not reveal any good specimen. Altogether 6 examples were recovered, 5 of them are broken. The most typical example (no. 56) came from the biggest pit of Site 46. It has a prominent plano-convex cross-section, bevelled and convex cutting edge. The other two specimens (Nos. 55 & 57) are crudely chipped though they reveal polish near the cutting edge. No. 54 from layer (1) has a convex longitudinal profile, under surface concave, besides convex cutting edge. The narrowing butt has two mild grooves on two sides, possibly for hafting. A few intact specimens were discovered from surface and No. 36 from the surface is the best example of shoe-last celt from Nagajunakonda.

Plate No. LVI & Fig. 64

No.54 Site 46/322-B, Layer(1) 4·2 cm. × 9·3 cm. =1:2·21
No.55 Site 46/362-E, Pit 32 2·8 cm. × 6·9 cm. =1:2·46
No.56 Site 46/362-B, Pit 15 2·9 cm. × 6·2 cm. =1:2·14
No.57 Site 46/342-C, Pit 9 2·9 cm. × 6·4 cm. =1:2·21

Type 5 (long weeding hoe):

These tools have been differentiated from elongated celts in having a long handle and a comparatively flat under surface. It is apparent from No. 59, which possesses a triangular medial cross-section, elongated body, deep convex cutting edge, a long handle and thinner lower half, which were meant for digging or weeding rather than any other purpose. The undersurface of the lower half is quite oblique to the handle. The cutting edge shows polish, which may be due to constant use also. The other specimen is roughly trapezoidal in medial cross-section and also has a flat undersurface, convex cutting edge and a chipped body. The cortexed narrowing upper part serves as handle.

Plate No. LVII & Figs. 64 & 66

No.58 Site 46/362-A_6, Layer(2)	5·1 cm. × 18·6 cm.	=1:3·70
No.59 Site 46/362-E_2, Layer(2)	5·5 cm. × 18·1 cm.	=1:3·29

Type 6 (pick):

These tools, generally with a convex longtitudinal profile, flat or slightly concave undersurface and high but narrow ridge may be divided into 2 sub-types, namely, (a) *pick with single cutting edge* and (b) with *double cutting edge*. Sub-type (b) is the unique tool type from Nagarjunakonda.

a. Pick with single cutting edge

There are two types of cutting edges, viz., (i) pointed and (ii) comparatively wider cutting edge. They have either triangular or sub-rectangular medial cross-section. No. 60 and 63 have roughly triangular cross-section with pointed-end. No. 60 has a chipped body and flat cortexy under surface; blunted-butt and working end are comparatively less thicker than that of the humped middle portion. The pointed end, slightly polished, either intentionally or due to constant use, is fairly well-preserved. It is difficult to say whether this type was used as a drill.

The other variety of pick with single cutting edge has, more or less, sub-rectangular cross-section and snapped butt-ends. No. 61 has its lower-half polished. Butt-end shows chipping only. No. 62 has a chipped and ground body. The abrupt narrowing of the pick-end in this tool is an unusual feature. This variety may be nearer to the chisel. The upper part of No. 64 is missing.

Plate Nos. LVIII & LIX

60. Site 46/362-B_2 Layer(2)	17·1 cm. length.
61. Site 46/362-B_4 Pit-9	0·9 cm. × 11·3 cm.
62. Site 46/362-C_4 Layer(2)	1·9 cm. × 14·9 cm.
63. Site 46/362-B_2 Layer(2)	broken.
64. Site 47/360-B_1 Layer(3)	broken.

b. Double cutting edge

This may further be sub-divided into 2 categories, namely (i) pick-cum-hoe and (ii) double-pick. The former, represented by one specimen, is unique in India. The sharp and convex hoe-end was produced by the intersection of a pronouncedly levelled ventral surface with that of the dorsal surface. In case of the pick-end, the width is just half of the hoe-end; bevelling was made just in the reverse way. It has a straight cutting edge, polished but slighfly worn out. The middle portion facilitates gripping also. Possibly either end had been serving as handle when the other one was put to use.

The other variety is represented by 4 specimens. No. 68 has got almost similar body as that of No. 66 but differs in having two similar working ends, which are pointed. It is a partially ground specimen and ventral surface slightly concave No. 65 possesses a humped middle portion, which slopes down in mild gradients to meet that flat under surface at both the ends. One of its ends was only chipped, the other end is an evolved example due to its better workmanship. In the thicker end the surfaces converge into an acute angle to produce an oblique but sharp cutting edge. This feature is not so prominent in other two specimens (67 & 69). No. 69 is a ground specimen of this type with a humped middle portion and an almost angular longitudinal profile. It is not unlikely that the oblique edge was used for cutting weeds and herbs, whereas the other end served as 'pick-hoe', a type also found in the Bellary region by Bruce Foote. A specimen similar to No. 67 comes from the chalcolithic level of Nevasa. Two such specimens, collected from Raichur District, are found exhibited in the Hyderabad Museum. All the specimens from Nagarjunakonda have roughly rectangular cross-section.

Plate No. LIX & Fig. 66

65. Site 46/362-B, Pit-1A	1·2 cm. × 12·7 cm.
66. Site 47/360-B, Layer(2)	2·8 cm. × 10·9 cm. (hoe-end).
	1·4 cm. × 10·9 cm. (pick-end).
67. Site 46/362-C, Layer(2)	1·5 cm. × 14·3 cm.
68. Site 46/362-A, Pit 3	0·8 cm. × 11·5 cm.
69. Site 46/363-A, Layer(2)	2·8 cm. × 16·2 cm.

Type 7 (chisel):

All the specimens are damaged. No. 73, the present length being 15·1 cm. is the best preserved example. It has roughly a rectangular cross-section, polished body and tongue-like chisel-edge. No. 74 has a ground body. Nos. 70 & 71 are represented only by their lower ends. Nos. 74 & 70 were recovered from the same pit.

Plate No. LX & Fig. 66

70. Site 46/362-A,	Pit-28	2·9 cm. × ——
71. Site 46/362-B,	Layer(2)	2·9 cm. × ——
72. Site 46/362-C,	Layer(2)	2·6 cm. × ——
73. Site 46/362-E,	Layer(2)	1·6 cm. × 15·1 cm. (?)
74. Site 46/362-A,	Pit 28	2·9 cm. × ——

Type 8 (axe-cum-hammer):

Rectangular in external form it has a lenticular or lenticulo-elliptical medial cross-section. This type is conspicuous for its truncated and constricted butt-end. No. 77 has its dorsal surface so rechipped as to meet abruptly the undersurface. The rectangular depression on one side of the butt and rough chipped surface on the other surface are meant for easy hafting. The difference in width between the cutting edge and the butt-end is only 9 mm. No. 75 has a squarish body, with constricted butt and rechipped deep convex cutting edge. No. 76 is a polished example, though the butt-end is left unpolished to facilitate hafting.

Plate Nos. LX & LXI & Fig. 66

75. Site 47/359-D_1	Pit-9A	5·9 cm. × 7·0 cm.	=1:1·18
76. Site 46/362-B_4	Layer(2)	6·3 cm. × 10·1 cm.	=1:1·60
77. Site 46/363-A_1	Pit-46	6·5 cm. × 9·5 cm.	=1:1·46

Type 9 (side chopper on flake):

It is represented by a solitary example having a thick back, with small depressions for finger-rests and thick heavy butt. Two surfaces, emanating from the thick back, gradually converge so as to form a sharp lateral marginal edge, which bears use-marks also. Such type is not reported from other sites, but Foote's collection in the Madras Museum includes one "chopper" (No. 625), comparable to the present example. In view of its clear chopping edge it cannot be considered as an unfinished tool.

Plate No. LXI & Fig. 64

78. Site 46/362-B_4, layer (2).

Type 10 (fabricator):

The most beautiful specimen (no. 79) was found in association with a horn of a deer, which could have been employed in indirect percussion techinque. The other specimen (No. 80), having a cortexy back, is bigger than No. 79. Bruises are seen on all the three specimens discovered at Nagarjunakonda.

Plate No. LXI & Fig. 66

79. Site 46/362-C, Layer 2.

80. Site 46/342-D_4, Pit 52-B.

L. MICROLITHIC INDUSTRY

All the neolithic phases of Nagarjunakonda were associated with a non-geometric microlithic industry, typologically belonging to short-blade tradition. Of the finished tools more than 70% in Site 45 is blade, whereas the same tool-type constitutes more than 80% in Sites 46 and 46-A, the percentages of retouched specimens at Sites 45, 46 and 46-A are about 40%, 30% and 25% of the total quantity of finished products respectively.

It will be evident from Table IV that the microlithic industry of Site 45 ascribable to Neolithic Phase I, was dependent mainly on chert pebbles. The most developed phase, Site 46, however, witnessed the use of a still harder stone such as rock-crystal as the primary

TABLE IV

Material-wise Classification of Microliths from Trench A_2, Site 45

	Core	Core-trimming flake	Other waste flake	Unretouched blade	Unretouched blade with cortexed back	Retouched blade	Lunate	Point	Scraper	Core-scraper	Total	Percentage
Chert	30	376	195	45	8	23	8	2	5	1	693	83·49
Chalcedony	11	39	24	8	—	—	—	1	—	2	85	10·24
Carnelian	4	6	5	1	—	—	—	1	—	—	17	2·05
Crystal	—	—	6	1	—	—	—	—	2	—	9	1·08
Agate	3	5	13	1	—	—	—	1	—	—	23	2·77
Jasper	—	—	1	—	—	—	—	—	—	—	1	0·12
Quartzite	—	—	1	1	—	—	—	—	—	—	2	0·24
	48	426	245	57	8	23	8	5	7	3	830	

raw-material for fashioning tools. The latter stone forms 1·08% of the total in Site 45 but at Site 46 (See, Table VI) its percentage mounts to 93·72%. Conversely, the last-mentioned site i.e. the most developed phase, disclosed only negligible proportion of chert, which forms 83·49 % of the total at Site 45, Sites 46A and 47, representing Neolithic Phase II of Nagarjunakonda, practically hold an intermediary position or more precisely signify the transitional phase, so far as the use of chert as the raw-material for microliths is concerned. The continuity of chert microliths and the greater predisposition for rock-crystal appear to be the characteristics of Site 46-A. It may be mentioned here that the statistics in respect of Site 47 given in Table VI and VII do not possibly reveal a true picture, since no microlith was encountered at the time of the actual excavation; most of the specimens under report were collected only during re-examinations of the excavated sections and while excavating the partially scooped out pits. The cultural materials recovered from Site 47 are assignable to Neolithic Phase II of Nagarjunakonda.

Technologically the industry practically remained unchanged, save for minor variations, throughout the neolithic period of this valley. The impact of ribbon flake tradition

did not perhaps reach Nagarjunakonda. On the other hand blades had a tendency to become shorter in length with the advancement of the neolithic culture. Those from Site 45 i.e., Phase I range in length between 1·8 cm. to 4·5 cm. the highest concentration being in the length-group of 2·5 cm. At Site 46 they vary between 1·1 cm. to 2·2 cm. and the longest blade from Site 46-A measures 2·9 cm. only. This variation in length besides other reasons, may largely be due to the use of different types of raw material.

A few other developments may also be noticed in this microlithic industry. Tanged unretouched blades forming a fairly good proportion in Site 45 are practically absent in the succeeding phases. The majority of the lunates show use-marks on the chord, are either blunted fully, or partially retouched; these are common at Site 45 but absent in the developed stage. Another interesting feature is the occurrence of comparatively longer specimens of lunates and indeed they are exquisite specimens also—at Site 46 i.e., in the most evolved phase. Unretouched backed blades are more common in the earliest phase, Site 45. Core scrapers, no doubt, continued from the beginning to the end of the neolithic culture of the valley, but periods posterior to Phase I saw slight change in the technique of preparation of the working edge—those from Site 45 have a minutely retouched edge whereas examination of similar examples from Sites 46 and 46A reveals that the edge was brought about only by the intersection of the ventral flake-scar with the cortexy dorsal surface. Whether these changes are of any chronological significance or, are tantamount to some sort of evolution, is not easy to decide in the present state of our knowledge.

1. Microliths from site 45

(i) General Remarks

The dawn of neolithic culture of Nagarjunakonda ushered in Site 45 where a few neoliths, characterised by their crudeness were discovered in association with a large number of microliths, mainly of chert, and crude pale brown pottery. The preponderance of cores, pebbles and waste flakes suggests the existence of a factory. Of the total number of 1582 pieces recovered from this site, 67·81% goes to debitage but all are in excellent state of preservation and without patina. Trench B_4 of this site yielded a cluster composed of a larger number of utilized cores, discarded cores, waste flakes etc. Trenches A_3, A_4 and B_4 were rich in finished product, quite a good percentage showing signs of utilization. The number of finished implements is 276 and their distribution is as follows:—

Unretouched blades	155 (56·15%)	202 (73·18%)
Retouched blades	47 (17·02%)	
Lunate blades	25 (9·05%)	
Point blades	14 (5·07%)	
Scraper blades	35 (12·68%)	

About 50% of the finished tools contain no secondary working. Table V gives the distribution of tools in different trenches and their typological classification.

Blades unearthed from this site are relatively shorter than those from Site 45-A, but as already pointed out, comparatively longer than the blades of the other developed

neolithic facies. Flake-scars on cores have a length ranging between 2·2 cm. to 3·7 cm. the average width being 0·7 cm. Actual blades vary in length from 4·5 cm. to 18 cm. Those having more than 4·0 cm. in length are very few and the majority of them range in length between 2·0 cm. to 3·0 cm. A restricted number of them show snapped end; blades with thick cortexed back are also of common occurrence. This assemblage has also laid bare specimens with tang, though not very well-defined in all cases, and it is interesting to note that practically all such specimens came from Trench A_2. The presence of tang, call it incipient or undefined, is noticed also in tool-types other than blades (Fig. 67).

TABLE V

Distribution and Classification of implements from Site 45

Trench No.	Waste materials					Tools									
	Peble	Core	Rejected core	Core trimming flakes	Other waste flakes	Unretouched blades	Unretouched blades with cortexed back or side	Retouched blades	Lunate	Point	Scarper	Core Scraper	Total	Bigger flakes	Neoliths
Trench A_2	1	11	7	91	4	3	1	1	2	—	1	—	122	—	—
Trench A_3	1	12	1	—	4	32	7	12	8	6	6	2	91	17	—
Trench A_4	5	48	—	426	245	57	8	23	8	5	7	3	835	14	—
Trench A_5	—	2	3	26	6	8	—	2	—	—	—	—	47	8	—
Trench B_2	25	23	42	38	3	2	—	—	—	1	5	3	142	8	—
Trench B_3	8	9	15	91	44	11	—	2	4	1	3	2	190	5	2
Trench B_4	3	10	5	56	22	22	2	6	3	1	2	—	132	12	—
Trench B_5	—	1	—	7	4	—	—	1	—	—	—	1	14	6	—
Trench C_2	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—
Trench C_3	—	—	—	1	—	—	—	—	—	—	—	—	1	—	—
Trench C_4	—	1	—	2	3	1	1	—	—	—	—	—	8	1	—
	43	117	73	738	335	136	19	47	25	14	24	11	1582	73	
Percentage	2·72	7·40	4·62	46·65	21·17	8·60	1·20	2·97	1·58	0·89	1·52	0·70			

Only Trench number is mentioned in the description of the tools and cores since all the trenches fall in Division 3 of Sector S. VI and barring no. 7 and 71 all these illustrated specimens came from layer (4). Unless it is specifically mentioned all of them are made on chert.

(ii) Cores and Flakes

Chert pebbles, constituting 2·72% of the total, must have been collected from the river Krishna. They were expected to undergo an elaborate process of preparatory treatment like trimming of cortexy surface, preparation of striking platform etc., before being utilized as cores for obtaining actual blades and other implements. The examination of discarded cores and pebbles indicate that the preparation of a platform was the first stage of manufacture followed by core-trimming operation.

The vast majority of cores exhibit single faceted platform wherefrom flakes had been taken out longitudinally: parallel longitudinal flake-scars struck from one platform result in fluting. Such cores generally display cortexed back, though examples showing the removal of flakes all round are also not lacking. Double-platform cores are rather rare and there are also cases where no platform is specially made because the flat natural pebble surface was used as the striking platform.

Cores were often rejuvenated into scrapers etc. by means of lateral, basal, apical ventro-longitudinal or dorso-longitudinal trimming. Evidences are there to suggest that apical or basal part of fluted core had to be removed obliquely in order to achieve a working edge, to be retouched subsequently. In some cases the ventral side, having longitudinal flake-scars had been struck off from the original striking platform; a few scrapers made on such rejuvenated flake occur in the present collection also and even the resultant core was occasionally utilized for further preparation of tools. Fluted cores are mostly conical or flat chisel-ended in shape and include certain quantity of cylindrical ones as well. Double-platform cores reveal either cross-flaking or flaking from two opposite platforms, not at right angles to each other.

The following selected specimens are illustrated: (Pl. LXII & Fig. 68).

1. Conical shaped with pointed base, cortexed back, longitudinal flake-scars, struck from one platform, length of flake-scar 3·5 cm. From Tr. A_2.

2. Double platform core, comparatively broader flakes taken out from two platforms which are at right angles to each other, both longitudinal as well as transverse flake-scars are noticeable, length of flake-scar 3·7 cm. width 1·6 cm. From Tr. A_4.

3. Straight chisel-ended, flakes struck from a single faceted platform, cortexed margins, cortexed back removed by dorso-longitudinal trimming, length of flake-scar 2·8 cm., width 0·8 cm. From Tr. B_2.

4. Flat-based cylindrical, flakes taken out from a single unfaceted platform, cortexed back. From Tr. A_2.

5. Discarded single platform pebble-core, only few flakes have been removed. From Tr. A_4.

6. Double platfrom core, comparatively broader flakes struck from two opposite platforms. From Tr. B_4.

7. Discarded pebble-core, natural flatish plane serving as a striking platform, attempts were made to remove three flakes. From Tr. A_4.

8. Example of ventro-longitudinal trimming, fluted surface was removed completely, cortexed back remains. From Tr. B_2.

9. Conical-shaped, pointed based, single unfaceted platform, cortexed back, apex obliquely removed. From Tr. A_4.

10. Flat but conical in outline, pointed bases, cortexed back, single faceted platform, length of flak-scar 2·75 cm. width 0·6 cm. From Tr. B_3.

11. Pointed based, flakes taken out in all directions from a single faceted platform, small patch of cortex remains at the lower end, length of flake-scar 3·1 cm. width 0·5 cm., From Tr. A_4

12. Broad convex chisel-ended, faceted platform, flakes struck longitudinally, length of flake-scar 2·3 cm. width 0·6 cm. From Tr. A_4.

13. Straight chisel-ended, longitudinal flake-scars struck on all directions from single faceted platform. From Tr. B_4.

14. An example of lateral trimming of a fluted core. From Tr. A_2.

15. Fragment of a flake of a ventro-longitudinal trimming. From Tr. B_4.

16. Fake of a ventro-longitudinal trimming, cortexed rounded base, original core practically divided into two halves. From Tr. A_2.

17. An example of apical trimming of a chisel ended core. From Tr. B_3.

18. An example of basal trimming of a fluted core with a plane natural platform. From Tr. B_4.

19. Cortexed rounded based core with a single platform flakes removed longitudinally in all directions. From Tr. B_2.

20. An example of apical trimming of a fluted core. From Tr. A_2.

(iii) Typological Classification of Microliths.

Microliths from this site may be divided into five types, namely, (a) Simple blades, (b) backed blades, (c) lunates, (d) points and (e) scrapers.

(*a*) *Blades:* In shape these blades, mostly unretouched, conform to two-sub-types, e.g. parallel sided and long leaf-shaped, the latter with a narrowing distal end, concave under surface and truncated medial ridge. Some of the blades have their distal end snapped and in one case the cutting edge was serrated. A few of them had been provided with tang as well, but generally these are small-sized.

The following selected specimens are illustrated: (Pl. LXII & Fig. 68).

21. Narrowing distal end concave undersurface and a wavy medial ridge, length 4·1 cm. From Tr. A_2.

22. Long leaf-shaped, slightly concave undersurface, truncated medial ridge, use-marks on one of the margins, length 3·0 cm. From Tr. B_3.

23. Almost parallel-sided, distal end slightly cortexed, wavy medial ridge, use-marks on one of the margins, length 2·85 cm. width 0·7 cm. From Tr. B_3.

24. Parallel-sided blade of greyish quartzite, length 2·3 cm. width 1·5 cm. From Tr. B_4.

25. Parallel-sided blade of agate, length 1·8 cm. width 0·3 cm. From Tr. A_4.

26. Curved knife blade, use-marks on its margin. From Tr. A_4.

28. Blade of agate with bulbous end snapped, longitudinal flake-scars on the uppersurface, slight protruberance near the cortexed end serves as an incipient tang. From Tr. B2.

29. Parallel-sided, distal end snapped, truncated medial ridge, use-marks on one of the margins, length 2·4 cm. width 0·8 cm. From Tr. A_4.

30. Tanged blade, one of the margins retouched. From Tr. A_2.

31. Parallel sided, blade of agate, length 2·0 cm. width 0·5 cm. From Tr. A_4.

32. Parallel sided, distal end snapped medial ridge truncated near the bulbous end, length 2·5 cm. width 0·5 cm. From Tr. E_2.

33. Small tanged blade with convex top, longitudinal flake-scars on uppersurface. From Tr. A_2.

34. Parallel sided blade of agate, with serrated edges upper part broken, undersurface concave, intact end cortexed longitudinal flake-scars on the uppersurface. From Tr. B_4.

(b) *Backed blades:* There are three varieties, namely, unretouched, retouched, and retouched oblique-back, besides few tanged specimens. The unretouched ones have generally thick cortexy back, in some other cases cortexed half serves as some sort of a back. Blades with actual back have triangular cross-section, the apex of the triangle being on the line of cutting edge. Some of the backed blades look like triangular or leaf-shaped in outline. The latter shape has generally a notched butt, meant possibly to lash the shaft firmly; there is, however, one example with an incipient tang. One of the tanged examples has a cortexed back. The majority of the retouched specimens have their medial ridge truncated, with concave undersurface and thick bulbous end.

The following selected specimens are illustrated: (Pl. LXII & Fig. 68).

27. Tanged blade of chalcedony with a back provided by cortexed margin, bears use-marks. From Tr. A3.

(Pl. LXIII & Fig. 68)

35. Leaf-shaped flake, having a thick bulbous end, cutting edge to the left formed by removing a bigger flake, the other margin being left unchipped, serves as the back; a flake removed subsequently in longitudinal direction meant for finger-rest or facile hafting. From Tr. B_4.

36. Roughly triangular in shape, with thick cortexed back; a notch obtained by removing a flake at the thick bulbous end. From Tr. A_2.

37. Pen-knife blade, cortexed half serving as back, flake removed near bulbous end, meant perhaps for easy hafting, bears use-marks. From Tr. C_4.

38. Parallel sided tanged blade, slightly concave undersurface, thick bulbous end intentionally constricated for obtaining the tang, the ridge shifted very near to the margin, oblique distal end cortexed, length 3·4 cm., width 1·7 cm. From Tr. A_2.

39. Leaf-shaped flake, cortexed right hand margin serving as back. From Tr. A_2.

40. Leaf-shaped flake, cortexed half serving as back, has an incipient tang, bears use-marks. From Tr. A_3.

41. Unretouched backed blade, back cortexed. From Tr. A_4.

42. Unretouched backed blade, bulbous end broken, back cortexed. From Tr. A_3.

52. Triangular in outline, its oblique back partly retouched, lower half made thinner by removing a flake, cortexy margin below retouched back, possibly an obliquely blunt backed blade of chalcedony. From Tr. A_4.

53. Blade with oblique back fully retouched, longitudinal flake-scars on the uppersurface, length 2·3 cm., width 0·8 cm., From Tr. A_3.

54. Crescentic backed blade, back being retouched, lower part broken. From Tr. B_4.

55. Retouched backed blade, sides being more or less parallel, length 2·2 cm., width 0·4 cm. From Tr. A_4.

56. Obliquely blunted backed blade, length 1·8 cm., width 0·5 cm. From Tr. A_4.

57. Retouched backed blade of carnelian with high cortexy medial ridge, distal end also cortexed, bulbous end narrow length 2·3 cm., width 0·9 cm., From Tr. A_2.

58. Retouched backed blade, sides being more or less parallel, narrow bulbous end, medial ridge truncated, length 2·4 cm., width 0·7 cm. From T. B_4.

59. Retouched backed blade, bulbous end made narrower, distal end cortexed, length 2·7 cm., width 0·6 cm. From Tr. A_3.

60. Retouched backed blade, distal end thicker length 2·8 cm., width 0·7 cm., From Tr. A_4.

(c) *Lunates:* All the lunates have their arc blunted by retouching though in a few cases the middle portion was left unretouched, a practice observed at Maheswar also. No. 50, from the point of view of shape, may be called a triangle but since this assemblage did not yield any other identical example, it has been included in the group of lunates, furthermore, the angles are not so pronounced.

The following selected specimens are illustrated : (Pl. LXIII & Fig. 68).

43. Lunate with nicely touched arc, longitudinal flake-scars on the uppersurface, undersurface shows primary flake-surface. From Tr. A_2.

45. Lunate having longitudinal flake-scars on the uppersurface, middle part somewhat straight but unretouched, one of its ends comparatively thicker and twisted. From Tr. A_4.

46. Same as above, sign of utilization on the cord. From Tr. A_4.

47. Lunate, broken at the end, both the surfaces show primary flake-surface. Trench A_1.

48. Lunate with arc, except middle portion, retouched, one of its ends thicker and slightly twisted. From Tr. B_3.

49. Lunate with arc completely retouched, cord does not show sharp edge, possibly an incomplete one. From Tr. A_3.

50. In shape more nearer to traingle though the angle is not so pronounced, it has completely retouched back. From Tr. A_2.

51. Lunate with completely retouched arc, thick bulbous end, chord showing use-marks. From Tr. B_4.

(d) *Points:* This may be divided into three sub-types, e.g. unworked, worked from one side and worked from both the sides. Some of them were provided with an incipient tang or notch for easy hafting or as finger rest. It is interesting to note that most of the tools are of the stones of translucent variety.

The following selected specimens are illustrated: (Pl. LXIV & Fig. 68).

61. Leaf-shaped, retouched all along the margins. From Tr. B_3.

62. Long leaf-shaped, retouched all along the margins, barring the thick bulbous end, uppersurface cortexed. From Tr. A_1.

63. Pointed end obtained by simple chipping of the shoulders, uppersurface cortexed, made of banded chalcedony. From Tr. A_1.

64. Tip retouched from both the sides, though right hand margin fully worked, made of agate and has an incipient tang. From Tr. A_2.

65. Crooked end retouched from both the sides, back fully retouched. From Tr. A_4.

66. Retouched from both the sides. From Tr. B_3.

67. Pointed end obtained by retouching one side and mapping the other one, cortexed uppersurface, made of chalcedony. From Tr. A_4.

68. Retouched from one side, butt-end also worked, made of agate. From Tr. A_4.

69. A flake with a hard, pointed tip, no secondary work, has a high, wavy medial ridge, consequent on the removal of flakes transversely from both the sides of the ridge, a flake has been removed from the butt-end posibly to facilitate hafting or for finger-rest. From Tr. B_2.

70. Broad leaf-shaped flake with notch at the bulbous end. From Tr. A_3.

71. Crescentic point of chalcedony with thik bulbous end and concave undersurface. From Tr. A_4.

72. Pointed end achieved by simple chipping, made of agate. From Tr. A_4.

73. Crescentic point, back completely blunted by retouching slight protuberance at the bulbous end meant for hafting or as finger rest, use-marks on the upper part of the left hand margin. From Tr. A_1.

(e) *Scrapers:* They are mainly of two types, e.g., scrapers on flake and scrapers on core, the latter may again be subdivided into two, namely, fluted core re-utilized as scraper and those made on pebble.

The following selected specimens are illustrated: (Pl. LXIV & Fig. 68).

74. Side-cum-concave scraper on a cortexed pebble. From Tr. B_2.

75. End scraper on a pebble, one side cortexed, finger rest on both sides of the central ridge. From Tr. A_3.

76. Side scraper on a reutilized core. From Tr. B_5.

77. Chalcedony scraper on a chisel-ended fluted core, nicely retouched scraping edge. From Tr. A_6.

78. Discoid scraper. From Tr. B_2.

79. Scraper on a pointed based fluted core agate, nicely retouched scraping edge. From Tr. B_3.

80. Scraper on chisel-ended fluted core of chalcedony. From Tr. A_2.

81. Side-scraper on a flake, triangular protruberance serving as finger-rest. From Tr. B_6.

82. Tanged scraper on rock-crystal, retouched on all sides. From Tr. A_4.

83. Thumb-nail scraper with arrangement for finger-rest. From Tr. B_2.

84. End scraper on a flake obtained by ventral longitudinal trimming. From Tr. A_4.

TABLE VI

Analysis of Material used for Microliths in different Neolithic sites

Name of Site	Crystal	Chert	Chalcedony	Carnelian	Agate	Quartz	Total
Site-46 From Neolithic Stratum	29	1	2	—	1	2	35
From Pits	135	2	1	1	1	—	140
	164	3	3	1	2	2	175
Percentage	93·72	1·71	1·71	0·58	1·14	1·14	
Site 46A	44	15	8	7	2	4	80
Percentage	55·00	18·75	10·00	8·75	2·5	5·00	
Site 47	1	12	4	2	7	2	28
Percentage	3·57	42·86	14·29	7·14	25·00	7·14	

2. Microliths from Other Neolithic Sites.

Microliths discovered in excavation from Sites 46, 46-A and 47 are described in this section. Those recovered in Sites 46A and 47 came exclusively from pits of various shapes and dimensions, whereas at Site 46 microliths were concentrated not only in pits but also in strata. The frequency of microliths from these sites is considerably low in comparison to Site 45, despite the fact that much larger area than that of the last-mentioned site was taken up for intensive excavations. Table VI gives the distribution of tools in these three sites.

Tools unearthed from Sites 46, 46A and 47 are mostly fragmentary, though invariably showing signs of utilization. There is, however, no reason to presume that they were only habitational sites where manufacturing of tools might not have been undertaken, since the presence of cores and waste flakes may imply fabrication of microliths at the site proper. But nature of stone and the technique employed might have been responsible for comparatively low percentages of core and waste flakes. Tools had been prepared generally on well-faceted crystal, still available in the neighbouring hill known as *Tellaralabodu* or white stone hill (Fig. 69).

TABLE VII

Analysis of Microlithic Tools from other Neolithic Sites

	Blades	Retouched blades	Lunates	Tanged cresentic tool	Point	Scraper	Core	Flakes	Total
Site 46, Neolithic Stratum	13	5	—	2	2	3	5	5	35
Site 46 Pit	81	8	4	7	2	6	6	26	140
Total	94	13	4	9	4	9	11	31	174
Percentage	53·71	7·43	2·29	5·14	2·29	5·14	6·28	17·72	
Pit Site 46A	38	5	4	2	—	2	1	28	
Percentage	47·50	6·26	5·00	2·50	—	2·50	1·25	35·00	
Pit Site 47	3	—	—	—	—	—	2	23	28
Percentage	10·72						7·14	82·14	
Total	135	18	8	11	4	11	14	82	283
Percentage	47·70	6·36	2·82	3·89	1·41	3·89	4·95	28·98	

3. Cores and Flakes.

As it will be evident from Table VII, the number of cores from these sites excluding the utilized specimens is only 14. Needless to say that a few examples of well-faceted crystal were also discovered in excavation, and tools made on such material have often retained the original prismatic surface. Generally one of the pyramidal parts of the prism was removed in order to have striking platform, which often reveals in the examples in hand a rough surface or faceting: flakes must have been taken out from this platform longitudinally. The use of such material did not involve any preparatory treatment of the core, and as such the very selection of this stone was a time and labour-saving device. Further, the wastage was reduced to a minimum and there had been scope for utilizing the residual core as well. The low frequency of cores and waste-flakes at these sites may, therefore, be due

to the use of well-faceted crystal as the primary raw material for fashioning tools. The real conical-shaped core is absent at Sites 46 and 46-A; there is only one such example on carnelian at Site 47. That cross-flaking was also practised is evident from no. 9, which is a core-scraper on crystal. No. 4 has two platforms, opposite to one another. But it may safely be concluded on the basis of the available data that neither cross-flaking nor the method of flaking from two opposite platforms needed wide practice in view of the availability of prismatic rock-crystal in the vicinity.

The following selected specimens of cores are illustrated: (Pl. LXV).

1. Single platform core of chert, with cortexed back, longitudinal flake-scars result into fluting. From Site 47/Sector NIV, pit 12.

2. Faceted single platform core of carnelian, fluting at the back also. From Site 46/Sector NV pit 21.

3. A pointed based core of carnelian, flakes are removed on one side from a single plain platform; back part removed by means of longitudinal trimming. From Site 47/Sector NIV, pit 9.

4. Double platform core of crystal, platforms opposite to one another, half of the core retains its original prismatic surfaces. From Site 46/Sector NV, pit 44.

4. Classification of Microliths.

Microliths from these three sites may broadly be classified into six types, e.g. (a) blades, (b) backed blades, (c) tanged crescentic tools, (d) lunates, (e) points and (f) scrapers. The relevant information is summarised in Table VII.

(a) *Blades:* Unretouched blades fall under 5 sub-heads, namely (i) parallel sided, (ii) blades with pointed end, (iii) curved blades (iv) leaf-shaped flakes and (v) serrated blades. The majority of the blades are parallel-sided though the bulbous end is comparatively narrower, and they have concave undersurface, the wider distal end being sometimes curved towards the ventral surface (nos. 15 and 19). Very often undersurfaces of these blades show prominent ripple-marks, possibly the result of following punch technique for detaching flakes. No. 10 from Site 46-A is the largest crystal blade from these sites with all the above mentioned characteristics. Blades with pointed end coming mainly from Site 46, are relatively longer than other varieties. There is definitely a dearth of complete specimens belonging to this group.No. 14, however, is the only intact one, which has constricted bulbous end also. Medial ridge was truncated in all the sub-types except in the sub-type (ii). Curved blade and leaf-shaped flake are each represented by one example. No. 11 is very near to saw blade-serration and confined to the both margins leaving a little portion unworked, the latter characteristic is indicative of the fact that this serration was not due to use.

The following selected specimens are illustrated : (Pl. LXVI & Fig. 70).

10. Largest specimen of parallel-sided blade of crystal; thick distal end curved towards ventral surface, truncated medial ridge length 2·9 cm., width 0·89 cm. From Site 46A/ Sector SVI, pit IC.

11. Fragment of a parallel-sided saw-blade of crystal with truncated medial ridge-edges of upper portion show serration; portion without serration for facile grip. From Site 46/Sector NV, pit 33.

12. Crystal blade with pointed end, tip being broken, intact medial ridge, one of its edges serrated probably due to use, concave undersurface shows ripples, length 2·1 cm., width 0·3 cm. From Site 46/Sector NV, pit 15.

13. Parallel sided blade of crystal, truncated medial ridge, undersurface slightly concave length 1·95 cm., width 0·5 cm. From Site 46/Sector NV, pit 15.

14. Crystal blade with pointed end, intact medial ridge constricted bulbous end, length 1·7 cm., width 0·4 cm. From Site 46/Sector NV, pit 14.

15. Parallel-sided blade, partially truncated medial ridge, length 2·0 cm., width 0·5 cm. From Site 46/Sector NV, pit 28.

16. Curved blade of agate, cortexed margin near the distal end. From Site 46/Sector NV, Div. 382, Tr. C_2, neolithic stratum.

17. Almost parallel-sided crystal blade with thick end, which is however not a bulbous end, dorsal surface shows original prismatic surface, length 2·2 cm., width 0·7 cm. From Site 46A/Section SVI, pit IC.

18. Almost parallel-sided crystal blade with crooked distal end, truncated medial ridge, length 1·5 cm., width 0·6 cm. From Site 46/Sector NV, pit. 43.

19. Parallel sided blade of crystal with narrow bulbous end and medial ridge truncated, length 1·5 cm., width 0·5 cm. From Site 46/Sector NV, pit 43.

35. Broad leaf-shaped flake on chert, narrow butt-end serving as a tang, wavy medial ridge, right hand margin cortexed. From 46A/Sector SVI, pit 3.

(b) *Backed blades:* In these sites backed blades were invariably retouched save no. 33, which was recovered from a pit of site 47, ascribable to Neolithic Phase II of Nagarjunakonda. It is, therefore, fairly certain that back unretouched blades were confined mainly to Neolithic Phase I, the developed phase was without it. The majority of the retouched backed blades were wrought on materials other than rock-crystal. Retouched ones may be of two shapes e.g., parallel-sided and crescentic.

The following selected specimens are illustrated: (Pl. LXVI & Fig. 70).

20. Almost parallel-sided blade of agate with one of its margin blunted by retouching, length 2·0 cm., width 0·5 cm. From Site 46/Sector NV, pit 30.

21. Almost parallel sided blade of carnelian with back retouched, a broken specimen. From Site 46A/Sector SVI, pit. 3.

22. Same as above but both the ends of this agate blade rounded, length 1·5 cm., width 0·6 cm. Site 46/Sector NV, pit 15.

23. Crescentic backed blade of crystal with back blunted by retouching, chord shows use-marks, length 2·1 cm., width 0·6 cm. From Site 46/Section NV, Div. 382, Tr. C2, neolithic stratum.

32. Almost parallel-sided chert blade with blunted back, bears use-marks, length 2·3 cm., width 0·7 cm. From Site 46A/Section SVI, pit 2.

33. Unretouched backed blade of chert, length 2·0 cm., width 1·0 cm. From Site 47/Sector NIV, pit 7A.

34. Crescentic backed blade of crystal, serrated working edge near butt-end middle portion of the back not retouched. From Site 46A/Sector SVI, pit 2.

(c) *Tanged Crescentic Tools:* They are invariably very small specimens ranging in length between 1.1 cm. to 1·5 cm. and in width from 0·2 cm. to 0·4 cm. No. 36 has an oblique back though an incipient tang was also provided, in other cases back was nicely retouched. The purpose of these minutely executed tools is difficult to find out—in some cases chord appears to have been used. In fact No. 26 has a crescentic cutting edge. Like lunates the sharp edge of the chord was obtained by removing a flake longitudinally. Tang was generally retouched from both the margins. It may also be mentioned here that all the specimens are made of crystal.

The following selected specimens are illustrated: (Pl. LXVI & Fig. 70).

26. Tanged crescentic tool, back retouched, length 1·1 cm., width 0·3 cm. From Site 46/Sector NV, pit 24.

27. Same as above, length 1·2 cm., width 0·4 cm. From Site 46/Sector NV, pit 15.

30. Same as above, length 1·5 cm., width 0·4 cm. From Site 46/Sector NV, Div. 382, Tr. C_4, neolithic stratum.

36. Tanged tool with obliquely blunted back, length 1·1 cm., width 0·4 cm. From Site 46A/Sector SVI, pit. 2.

(d) *Lunates:* Invariably the arc was nicely blunted by retouching and the sharp edge of the chord was produced by removing a flake longitudinally from the dorsal surface, as a result a ridge was formed on the same surface. Attention may be drawn to the fact that lunates with primary flake-surface on both dorsal and ventral sides are not found in these sites, though they occur as a little percentage at Site 45. There is a solitary example from Site 46-A in which the middle part of the arc was left unretouched a practice generally noticed at Site 45. Site 46, the most evolved neolithic phase is, however, devoid of such specimens. In length these lunates vary between 1·4 cm. to 2·0 cm. and the maximum width ranges between 0·4 to 0·5 cm.

The following selected specimens are illustrated: (Pl. LXVI & Fig. 70).

24. Lunate of agate with arc blunted. From Site 46A/Sector SVI, pit 3.

25. Lunate of crystal with arc blunted, working edge formed by removing a longitudinal flake on the dorsal surface. From Site 46/Sector NV, pit 21.

27. Lunate of crystal with arc blunted. From Site 46/Sector NV, pit 22.

31. Lunate of crystal, chord serrated due to use possibly. From Site 46/Sector NV, pit 23.

(e) *Points:* There is a scarcity of points in these sites—only four specimens, those too from Site 46, were recovered. Possibly they were used as drill or piercer and all of them were made on crystal.

The following selected specimens are illustrated: (Pl. LXVI).

28. Slightly crooked point achieved by retouching from both the margins, tip broken. From Site Site 46/Sector NV, 382, Tr. V_4, neolithic stratum.

37. Thick oblong body with slightly crooked point on the right side of the broad shoulder, one margin of the pointed tip was retouched, broader distal end might have been used as a scraper. From Site 46/Sector NV, Div. 362, Tr. E_4, neolithic stratum.

(f) *Scrapers:* They are either on flake or on re-utilized core. All the specimens from Site 46 are of crystal, and those found at Site 46-A are on re-utilized fluted core.

The following selected specimens are illustrated: (Pl. LXV & Fig. 70).

5. End scraper on chert, flake, detached from a fluted core by means of longitudinal trimming, edge unretouched, From Site 46A/Sector SVI, pit 3.

6. End-scraper on a crystal fluted core, scraping edge brought about by the intersection of ventral flake-scar with fluted dorsal surface. From Site 46/Sector NV, pit 60.

7. Tanged end-scraper of crystal, oblique scraping edge formed by the intersection of dorsal surface with the concave ventral surface, retouched near the butt-end. From Site 46/Sector NV, pit 45.

8. Side-scraper of crystal with thick butt-end, other end made thinner by removing a flake, meant as thumb-rest, whereas the original prismatic surface serves as finger rest, under surface slightly concave. From Site 46/Sector NV, Div. 382, Tr. C_4, neolithic stratum.

9. Concave scraper on double platform core, two platforms at right angles to each other; slight retouching at the scraping edge. From Site 46/Sector NV, pit 54.

M. NEOLITHS FROM SURFACE

As already mentioned the main bulk of surface finds came from neolithic sites in Sectors N. IV, N. V and S. VI, which appear to be the focus of neolithic industry of the Nagarjunakonda valley. The concentration is confined to an area of two acres. It marks the last horizon of the neolithic sites situated in this region. Actually some of the specimens were found embedded inside the present surface of Site 46. This area was under dry crop cultivation and it is most likely that the top soil was practically scoured off, as a result of which these tools got exposed. 45 tools collected from this area were taken into account for study. The other locality yielded only a half-a-dozen neoliths, including the largest specimen of this valley. It was picked up from the northwestern corner of the *Peddakundella gutta*, very near the river Krishna.

Broadly speaking, the evidence of surface-material is complimentary to the result of analysis, derivable from excavated finds. The former however lacks variety that manifests itself so markedly in the collection from the regular dig. Axes from surface have generally lenticular, rectangular or rhomboidal medial cross-sections; and majority of them have flattish under surface. The number of adzes in comparison to excavated examples is only few. Blunt, or thin-but-narrow butts have comparatively higher frequency. Shoe-last celts and picks from surface supplement the evidence deduced from excavation. No. 106 from surface is the best example of shoe-last celt from Nagarjunakonda. The largest specimen of pick with twin working edges has a length of 26·5 cm. It was used possibly as hoe without any hafting arrangement; grooves on either side near the central portion are meant for easy grip. No. 94 from surface seems to be unique tool-type not met with in the excavation. It

may be termed as "spade-hoe". This tool has a broad blade and squarish body. The upper surface from the constricted butt-end slopes gradually to meet the ventral surface. The rough and chipped butt-end, relatively narrower than the blade proper, was meant possibly to facilitate hafting in the form of an adze.

One point worth mentioning in this context is the rarity of neoliths on the surface when the present writer first visited the valley and it was just after the first impulse for the collection of neoliths had subsided. This may tend to suggest that the neolithic industry of this valley was not as extensive or rich in number as that of Bellary.

The following representative specimens, mostly from Locality X, are illustrated:

(Pl. LXVII)

Surface No. 81: Axe with curved top and pointed-butt, partially ground, plano-convex cross section.

Surface No. 82: Axe, roughly triangular external form blunt butt-end and plano-convex section; unfinished sample.

Surface No. 83: Similar to No. 82 above but partially ground.

Surface No. 84: Unfinished pick with triangular external form and roughly plano-convex section.

Surface No. 85: Adze, same as No. 86 with blunted butt.

Surface No. 86: Adze, triangular medial cross-section, thin U-shaped butt, bevelled cutting edge, specimen entirely ground.

Surface No. 87: Axe; triangular external form, rhomboidal cross-section, narrow butt, almost straight cutting edge-rechipped body ground and polished.

Surface No. 88: Celt with elongated external form; roughly rectangular cross-section, blunted butt, chipped body.

Surface No. 89: Celt with elongated external form; upper part missing, deep convex cutting edge, ventral surface polished possibly due to use, found from Locality Y.

(Pl. LXVIII)

Surface No. 90: Axe, same as above but with a deep convex cutting edge, polishing confined to cutting edge.

Surface No. 91: Axe, triangular external form, rectangular cross-section, pointed butt, almost straight and, ground cutting edge.

Surface No. 92: Axe, triangular external form, flat rectangular cross-section, damaged butt end slightly convex cutting edge, polished.

Surface No. 93: Axe; triangular external form, pointed butt, roughly polished along the semi convex working edge.

Surface No. 94: Spade-hoe (?), broad squarish blade with constricted butt, hafted possibly as an adze.

Surface No. 95: Celt with elongated external form, lenticular cross-section, pointed butt, straight cutting edge, chipped and ground specimen (Fig. 65).

Surface No. 96: Axe; long ovoid external form, lenticular cross-section, thin-but-narrow U-shaped butt, straight edge, flattish undersurface, entirely polished example.

Surface No. 97: Adze, thin triangular cross-section, pointed butt, convex cutting edge, entirely polished; from Locality Y.

Surface No. 98: Axe-cum-hammer, lenticular cross-section, convex working edge slightly damaged.

(Pl. LXIX).

Surface No. 99: Axe, triangular external form, flat lenticular cross-section, pointed butt, convex cutting edge, body ground.

Surface No. 100: Axe, same as No. 99, body ground and polished.
Surface No. 101: Axe; same as above but convex oblique cutting edge, body partially polished.
Surface No. 102: Axe-cum-hammer, one side slightly damaged.
Surface No. 104: Axe-cum-hammer, one side slightly damaged.
Surface No. 104: Axe, same as above but with a ground surface.
Surface No. 105: Axe-cum-hammer; working edge only polished.
Surface No. 106: Shoe-last celt; a good specimen from Nagarjunakonda.

(Pl. LXX).

Surface No. 107: Pick, with double working end, the largest tool from Nagarjunakonda, possibly a tool used for tilling operation.

Surface No. 108: Pick with double pointed end.
Surface No. 109: Pick with double working end.
Surface No. 110: Pick same as 109.
Surface No. 111: Pick, with one working end.
Surface No. 112: Adze, triangular cross section, blunted with mildly convex cutting edge, entirely polished with deep-chipped body (see fig. 65).

N. FLAKES

In the excavation at Nagarjunakonda a large number of flakes and blade-like flakes of quartzite were found in the neolithic levels. In the majority of cases, these flakes are not secondarily worked into any standard tools, nor do they seem to be waste material of neolithic tool manufacture as no neolith on greyish quartzite was obtained in the valley. In addition to these quartzite flakes, others of dolerite were also discovered, but since all the neolithic tools are of dolerite, the existence of dolerite flakes is understandable. But it does not necessarily rule out the functional use of some of the dolerite-flakes.

Two different types of raw-materials, viz., quartzite and dolerite, were unearthed in the excavation. Both the varieties were easily available in the valley. In the early phase, the neolithic people depended more on river-worn quartzite pebble than on greyish quartzite nodules, large quantities of which are obtainable from the surrounding hills. In fact, the slopes of some of the hills were found strewn with cores and flakes, comparable to those recovered in the neolithic deposits. It is rather surprising that the earliest neolithic settlement did not generally exploit this kind of quartzite in spite of its abundance in the valley. The earliest phase disclosed either, basaltic, flakes or flakes taken out from quartzite pebbles. They did not however, occur in large numbers. But the last two phases witnessed an overwhelming frequency of greyish quartzite flakes. The reason for such change in the raw-

material is difficult to ascertain, since any quantity of quartzite pebbles could have been easily procured from the river Krishna.

The persistence of quartzite flakes, either taken out from pebbles or nodules, may suggest the existence of a flake-tradition in the neolithic assemblage of Nagarjunakonda. That these flakes were local manufactures is apparent from their huge bulk.*

TABLE VIII

Statistics of the material used in the preparation of flakes

No.	Trench	No. of Basaltic flakes	No. of quartzite flakes	Total	Remarks
45	Div. 12/A_4	22(81·48%)	5(18·51%)	27	With the exception of one all other quartzite flakes are taken out from brownish quartzite.
46	Div. 382/C_4	3(7·5%)	37(92·5%)	40	
46	Div. 362/C_5	2(4·4%)	43(95·5%)	45	
46	Pit 9	x	130(100%)	130	
46A	Pit 3	9(90%)	1(10%)	10	
46A	Pit 5	7(87·5%)	1(12·5%)	8	
47	Pit 7	12(37·5%)	20(62·5%)	32	
47	Pit 17	10(26·3%)	28(73·6%)	38	

The majority of the flakes with the wider flaking angle do not show any secondary working. But though they are only examples of primary flaking the shapes do recur and have either sharp cutting edge or a pointed end. Some of the dolerite flakes also exhibit identical character. Above all, use-marks on such flakes are not of rare occurrence. Flake-blades without any secondary working have sharp edges which can conveniently be used as knifes. Even at present, there are tribes who make use of convenient bits of sharp stone for chopping trees or fashioning wooden implements.

Quite a good number of quartzite cores were also recovered in excavation. In a few cases flakes have been taken out longitudinally in all directions from a single platform. Flakes, which may definitely be considered as rejects, sometimes show longitudinal flake-scars.

Broadly speaking, these flakes may be classified into four main groups, viz., (i) flake-blades, (ii) points, (iii) scrapers and (iv) wedges. Blades display a wide variety of shapes. Parallel sided blades have a high medial ridge and thick bulbous end. Flake-blades with thick back are either slender in shape or squarish. In some examples they have crescentic cutting edge. Possibly some of the backed flake-blades were used as knives. Flakes with pointed end might have been used as awl or drill. There are, nevertheless, points with

*These flakes could have been the survivals of an earlier period washed into Neolithic level with which the Neolithic folks had no apparent link—(Editor.)

definite secondary working. In one example, at least, the tang is deliberately worked out. Leaf-shaped flakes, do not generally exhibit any secondary working. Scrapers in the majority of cases are worked tools on flakes and show a wide variety. The use of wedge is attested to by the repeated occurrence of thick squarish flakes. A neolithic economy having a preponderance of axe and adze probably knew the use of wedge for splitting wood etc.

The occurrence of quartzite flakes in neolithic context is not known from other sites so far. Foote's list of unpolished artefacts includes flakes, scrapers, wedges, knives etc.,but they are invariably wrought on basaltic stones. In this connection, it may be mentioned here that scrapers, flakes, flake-knives from Bellary (Nos. 788-879 of Foote's Catalogue) though made on basaltic rock may well be compared typologically with those from Nagarjunakonda. Foote ascribes two wedges of grey quartzite recovered at Paspalle, site in Kurnool District and two worked quartzite flakes from Vidanapally (1852—1 & 2 of Foote's Catalogue) in Anantapur District to the neolithic period.

These quartzite flakes, in all likelihood, were utilized by the neolithic settlers of Nagarjunakonda in their daily requirements, which normally could not have been met with by the neolithic tools proper or by microliths. If the flake-blades are set aside, Nagarjunakonda neolithic pattern was without any knife, the function of which in some other sites was possibly carried out by the long chert ribbon flakes. Microlithic blades were too small and delicate to have served as knives employed for cutting tougher materials. These flakes are, therefore, a necessary appendage of the neolithic culture of Nagarjunakonda. That an element of flake-tradition though on trap rocks, existed in the neolithic sites of Bellary, may be gathered from an examination of the Foote's collection in the Madras Museum. A worked piece of trap (No. 2643 of Coggin Brown's catalogue), now in the Indian Museum, shows sharp polished edge which was intentionally brought about in order to utilize the flake as a tool.

The following representative examples are illustrated:

(Pl. LXXI)

1. Greyish quartzite; a disc-scraper. From Site 46/Div. 362, Tr. C_2, pit 43, neolithic stratum.

2. Basalt: a disc scraper. From Site 46/Div. 362, Tr. C_2, pit 19 (neolithic.)

3. Basalt; long asymmetrical flake without any secondary working, right dorsal surface cortexed, thickened at the bulbous end; use-marks on sharp, lateral cutting edge and butt-end formed as a result of removal of big flakes; possibly a chopping tool. From site 46 A/Div. 3-Tr. C_3, pit 3 (neolithic).

4. Greyish quartzite; flake-blade with thick back, thick bulbous end ledged, use-marks on cutting edge. From Site 46/Div. 382-Tr. C_2, neolithic stratum.

5. Greyish quartzite, flake-blade with thick back, crescentic cutting edge worn out, thick bulbous end. From Site 47/Div. 359-Tr. E_2, pit 5 (neolithic).

6. Greyish quartzite, rectangular blade with almost parallel sides, double ribbed; thick bulbous end constricted. From Site 46/Div. 362-Tr. B_2, neolithic stratum.

7. Greyish quartzite, flake-blade with thick back, high ridge towards the left, thick bulbous, end. oblique distal end. From Site 46 A/Div. 3, Tr. C_1-pit 1 B (neolithic).

8. Greyish quartzite, rectangular blade with thick back and high wavy medial ridge, bulbous end intentionally made thinner. From Site 46/Div. 362-Tr. A_2, neolithic stratum.

9. Greyish quartzite; asymmetrical flake with an awl-like pointed end. From Site 47/Div. 359-Tr. E_2, pit 5 (neolithic).

10. Brownish quartzite, long leaf-shaped flake, chipping at the bulbous end may be for hafting. From Site 45/Div. 12-Tr. A_4, neolithic stratum.

11. Basalt: leaf-shaped point, disturbed medial ridge, distal end deliberately worked into a tang. From Site 46/Div. 362-Tr. B_2, Neolithic stratum.

12. Greyish quartzite; roughly leaf-shaped point. From Site 46 A/Div. 3-Tr. C_1, pit 1C (neolithic).

13. Basalt; double-sided blade, wavy medial ridge, oblique distal end, worn-out edges. From Site 46 A/Div. 3, Tr. B_2, Pit. 5 (neolithic).

14. Greyish quartzite, broad flake with deliberately worked out shoulders, pointed tip broken, secondary working on one of the edges, bulbous end intentionally made thinner, possibly awl-cum-scraper. From Site 46/Div. 362 Tr. C_1, neolithic stratum.

15. Greyish quartzite; flake-scraper with thick oblique back, worn-out cutting edge. From From Site 46A/Div. 3, Tr. E_1, pit 8 (neolithic).

16. Basalt; patinated, a squarish flake with back, sharp cutting edge, broad distal end shows slight retouching. From Site 46 A/Div. 3, Tr. B_3, pit 4A (neolithic).

17. Greyish quartzite; flake-scraper, a roughly ovoid flake with secondary working on one edge, other edge thick, slightly concave undersurface; From Site 46/Div. 382, Tr. C_1 (neolithic).

18. Basalt, asymmetrical with thick bulbous end and a sharp cutting edge. From Site 45/Div. 12-Tr. A_2, neolithic stratum.

19. Basalt, asymmetrical flake with use-marks on both the edges. From Site 46 A/Div. 3-Tr. C_1, pit 1C (neolithic).

20. Basalt; flake scraper with concave working edge, showing use-marks. From Site 46 A/Div. 3, Tr. C_1, pit 1B (neolithic).

21. Basalt; scraper, broad flake with thick bulbous end, secondary working on oblique back. From Site 46/Div. 362, Tr. C_2, neolithic stratum.

22. Basalt; scraper, broad, thick flake with deliberately worked shoulders, left lateral edge; working edge obtained by secondary flaking, the other edge, thick. From Site 46 A/Div. 3 Tr. C_2, pit 4 (neolithic).

23. Basalt; nosed scraper, broad flake with a worked out shoulder and a pointed top, tip slightly broken. From Site 46/Div. 362, Tr. A_2, neolithic stratum.

24. Greyish quartzite; almost a miniature form of the type described at No. 25, below. From Site 46/Div. 362, Tr. C_1, neolithic stratum.

25. Greyish quartzite, a nicely retouched side-cum-end scraper on core thick back and a concave undersurface. From Site 46/Div. 382-Tr. E_4, neolithic stratum.

26. Greyish quartzite; side-cum-end scraper with an incipient tang, edges show secondary working. From Site 46/Div. 362, Tr. C_1.

27. Greyish quartzite; a double-platform core. From Site 46/Div. 362-C_2, neolithic stratum.

28. Greyish quartzite; a core with parallel longitudinal flake-scars. From same locus as above.

29. Greyish quartzite; a waste flake showing longitudinal flake-scars. From Site 47/Div. 359. Tr. D_1 pit 9A (neolithic).

30. Greyish quartzite, flake with crescentic back. From Site 47/Div. 350, Tr. D_1, pit 9A (neolithic).

31. Greyish quartzite, flake-blade with thick oblique back. From Site 46/Div. 382-Tr. C_2, upper layer.

32. Greyish quartzite, tanged flake-blade. From site 46/Div. 362 Tr. C_2, neolithic stratum.

33. Same as No. 31 above. From Site 46/Div. 382-Tr. C_2, neolithic stratum.

34. Basalt, flake-blade with thick oblique back. From Site 46 A/Div. 3, Tr. C_3, pit 3 (neolithic).

35. Greyish quartzite, same as above. From Site 46/Div. 382-Tr. C_2, upper layer.

36. Same as above. From Site 46/Div. 362 Tr. B_2, upper layer.

37. Greyish quartzite, wedge. From Site 46/Div. 362-Tr. A_2, upper layer.

38. Greyish quartzite, parallel sided blade with a thick bulbous end. From Site 46/Div. 382, Tr. C_1 pit 33C (neolithic).

39. Greyish quartzite, wedge. From Site 47/Div. 359 Tr. D_1, pit 9B (neolithic)

O. OTHER STONE OBJECTS

Neolithic pits yielded quite a large number of stone pieces, the identification of which in many cases is only a matter of guess. Many of them are river-worn quartzite pebbles. Since these stone pieces were found in a definite context and bear use-marks their utility as artefacts or household objects may be taken as a great possibility. They may be grouped under 8 sub-heads, namely (i) pestle (ii) saddle-quern, (iii) stone-ball (iv) hammer-stone, (v) dabber, (vi) hone or polishing stone, (vii) anvil and (viii) indeterminate stone objects. These artefacts reflect three types of activities, viz. (a) pounding of grains or food-stuff, (b) pottery making, and (c) manufacture of tools and implements.

(i) *Pestle:* Pestles were discovered generally from pits and may be divided into two types, viz. (A) those made on natural pebbles and (B) those prepared of sandstone. The latter catagory is often represented by fragmentary specimens, with triangular or plano-convex cross-section. Identical type was found at Maski and Maheswar. The other type is generally represented by intact specimens. The best example (No. 1) came from the neolithic stratum of Site 46. It has an elliptical cross-section and a cylindrical body. Two ends exhibit signs of battering, but sides are polished due to constant rubbing.

The following specimens are illustrated : (Pl. LXXII).

1. Pestle of quartzite pebble having a cylindrical body and elliptical cross-section, Circular ends show signs of battering—From Site 46, Div. $362\text{-}B_1$, neolithic stratum.

2. Pestle of oblong quartzite pebble, plano-convex cross-section, signs of battering on both ends. From Site 46, Div. $362\text{-}A_1$, neolithic stratum.

(ii) *Saddle-quern:* Pit 1 of Site 46 yielded a stone (35·6 cm. × 24·1 cm.) having a concave and shining surface. In all likelihood, it was used as quern. Nearby were found a number of broken pestles. The maximum depression measures about 15 cm. Similar examples came from pits 21 and 23 of the site.

(iii) *Stone-balls:* They are roughly oval or circular in shape and invariably made of basalt. Similar objects were found at Brahmagiri, Maski, Navdatoli and a few other sites and have been identified variously as spheroid balls, sling balls or hammerstone. In comparison to other sites, these stone-balls are quite meagre in number at Nagarjunakonda. One basalt piece, oval in shape (No. 1) has polish, possibly as a result of frequent rubbing. Out of six examples, four are with flattish surface. But there are two specimens which show battered surface. The multi-functional use of the same object is a feature not very uncommon in prehistoric or ethnographical studies. It seems that these balls were not made by human hands, atleast the evidence from Nagarjunakonda points to such a conclusion. Such balls could be found scattered near the trap-dyke along with nodules of various sizes and shapes. Thus, the neolithic population here probably made use of this available material. These stone balls appear to be a characteristic feature of neolithic or chalcolithic sites of the Deccan and Central India but are absent in Manbhum and Singhbhum. These balls are practically non-existent in the developed neolithic site of this valley.

The following specimens are illustrated: (Pl. LXXII B).

1. An ovoid basalt piece with sides polished; possibly used as rubber. From Site 46 A/Div. 3-C_1, Pit 1 B (neolithic).
2. Stone ball with battered surface. From Site 45/Div. 12-B_2 neolithic stratum.
3. A naturally formed basaltic ball. From Site 46 A/Div. 3, Tr. C_2, pit 3 (neolithic).

(iv) *Hammer stones:* It is not unlikely that many of the quartzite pebbles, so readily available, were put to a variety of uses. Their utility as pestles has already been referred to. According to the present classification, longish pebbles having signs of battering on one or both ends but with shining sides are identified as pestles. One the other hand circular, spheriod or flattish pebbles with battered ends or signs of battering around the periphery are taken to be hammer stones. Small size hammer stones might have been employed for subsequent dressing up of the flakes. Traces of breakage at the end of some of the pebbles recovered from pits, may be considered as additional ground for suggesting them as some sort of hammer stones.

(v) *Dabber:* There is only one specimen and that too a grooved natural pebble, with flat and wider base and comparatively thinner pole. The shining at the base and the similarity of this specimen with historical examples are reasons for accepting it as a dabber. It is very similar to Singhbhum and Manbhum specimens also. It came from the neolithic level of Site 45 where a very crude type of ceramic industry was unearthed.

(vi) *Hone or polishing stone:* This is fairly common in Sites 46 and 46-A. Two such examples were found from Pit 6 of Site 46-A along with a few other stones. Sub-trapezoid in shape, one of the flat basaltic slabs has three different planes, caused as a result of constant sharpening or rubbing. There is one vertical scratch-mark on it also. The other piece has also a shining surface. Pits 19, 21, 23 and 26 of Site 46 have brought to light one example each.

(vii) *Anvil:* Only one specimen found in association with the hones in pit 6 of Site 46-A may with some amount of certainty be considered, as stone-anvil. It is of granite and there are some dentations on one of its surfaces. Such small stone anvils might have been

needed for dressing or other subsidiary work. Rock-surface all around may well serve as stone-anvils for detaching a core from a bigger lump.

H. *Indeterminate Objects:* Pit8-A of Site 46-A disclosed a flat rectangular sand-stone piece with a cavity on each surface. It seems to be an incipient drill-hole. The object seems to be unfinished specimen of spindle-whorl. Site 46 brought to view a stone-fragment, which appears to be the mid-portion of a stone-casket. (Pl. LXXIII-A,1). Until further evidence is available no suggestion towards a probable utility can be satisfactory for such items.

P. MISCELLANEOUS OBJECTS.

(i) *Terracotta discs:* Terracotta discs, generally cut out of broken pottery, were recovered from pits of Site 46, 46-A and 47. They are more or less, rounded pieces. No. 2 of plate, though very small, is the best example from Nagarjunakonda. Bases of these discs are generally slightly concave. Bigger examples, however, are oblate in form but unfortunately no intact piece was recovered in excavation. Since a majority of these discs are broken and fragmentary it is difficult to determine whether they had any central perforation. Intact specimens do not show any perforation. But there is one example where sign a of piercing is noticeable. They are possibly used either as gaming counters or whorls, in case of latter type a hole might have been provided in the centre of the disc.

These pottery discs, also known from sites like Brahmagiri, Maski, Hastinapur etc., have been found in great numbers from Harappa and Mohenjo-daro. The commonest type, generally indifferently finished and with perforation, is made of pot-sherds, a practice also noticed in Pre-dynastic Egypt. Foote[1] has picked up such specimens from various sites of the Deccan.

The following specimens are illustrated: (Pl. LXXIII A).

2. Pottery- disc, nicely cut-out of polished black ware sherd. From Site 46, pit 21.

3. Pottery-disc cut-out of red ware sherd with sign of piercing on one side. From Site 46, pit 39.

4. Pottery disc cut-out of red ware sherd. From Site 46, pit 15.

(ii) *Bone:* In view of the presence of easily flakeable stone in the valley, bone was not possibly used extensively for tools. But the use of bone or horn as tools probably follows naturally from hunting or domesticating of animals as a major source of goods. Quite an enormous number of animal bones came from pits and it will not be an unwarranted hypothesis if it is assumed that some of the horns of antlers found in excavation were possibly used as awls or similar other purposes. Neolithic layer of Trench C_2, division 382 of Site 46 revealed an antler in association with a fabricator; the antler could have served as a bone punch. This was found broken into two halves. Human hand is noticeable atleast in two cases; these horns show a fairly smooth surface. Nevertheless, Pit 28 of Site 46 brought to light an indubitable evidence of high workmanship on horn. It appears to be a fragment of a cup or a trumpet with internally chamferred rim and ribbed body, the latter was brought

[1] R. Bruce Foote, *The Foote Collection of Indian Prehistoric and Protohistoric Antiquities—Notes on their ages and distribution*, (Madras, 1916) p. 61.

out by means of incised parallel lines. The fragment is so small as to defy any restoration. This type of rim offers no comparison with the neolithic pottery-types of Nagarjunakonda. It may easily be considered as an unique find of Nagarjunakonda, notwithstanding its fragmentary condition.

(iii) *Shell:* The neolithic settlement made extensive use of conch-shell, which was the raw-material for shell-beads. Pit 28 of Site 46 yielded one piece of such shell. Fragments of mussel-shells were recovered from pits I-B and 6 of Site 46-A, whereas pit 6 of Site 46 produced an intact example.

(iv) *Copper:* No other site, except Site 46 exposed to view the remnants of copper. On the basis of this solitary piece, broken into 2 or 3 fragments, this culture can remotely be described as having a chalcolithic colouring. These pieces were discovered from Pit 1 of Site 46 at a depth of ·53 m. The developed phase of Site 46, therefore, if not technologically but chronologically, may be grouped along with the other sites of chalcolithic affiliation. An extreme scracity of copper or bronze is in evidence at sites like Brahmagiri, Maski, Bahal, Jorwe, Maheshwar etc.

Q. BEADS

The total number of beads recovered from various neolithic sites is 134. Phases I & II, however, did not yield any bead. The main bulk, forming more than 91% of the total, came from Site 46, the most developed neolithic phase of Nagarjunakonda. In this site beads of four different materials, viz. paste, shell, steatite (one of them may have been made of faience) and red jasper were in use. Sixtynine specimens, out of the total number of 122 beads from Site 46, are made of paste. Shell beads, comparatively thicker and smaller in size, accounted for 50 specimens. There are three examples of steatite bead with greenish or bluish shade. In Site 46-A, only paste beads were noticed. Site 47, however, revealed 2 shell beads. Barring one example, all the beads are disc-shaped. Only one specimen (No. 14) and the only example in red jasper, is long-barrel-circular in type.

With the exception of a solitary steatite bead (No. 4) all other specimens, having variable diameters, came from neolithic pits, of comparatively smaller dimensions. Pit 22 of Site 46, measuring 1·42 m × 1·09 m. produced the maximum number of 19 disc beads (6 specimens in 7 mm., 4 in 6 mm., 3 each in 5 and 4 mm., 2 in 8 mm. and 1 in 13 mm.). Pit Nos. 1B, 12, 19 revealed 9, 10 and 12 examples respectively. Pit 5 of Site 47 disclosed 3 big sized beads varying in diameters between 13 mm. to 14 mm.

The beads range in diameter between 2 mm. to 15 mm. The thickness as well as the diameter of central perforation vary between 1 mm. to 2 mm. There is only one bead (No.11) from Pit 5 of Site 47, which has a thickness of about 2·4 mm. Shell-beads do not exhibit uniform thickness. They appear to have been hewn out from conch shell pieces. Beads having the same diameter recur in the same pit. It is evident from Table IX that these people had a preference for beads of smaller dimensions, the highest concentration being in the diameter of 7 mm.

This form of bead occurs at various other sites like Harappa, Mohenjadaro, Chanhudaro, Brahmagiri, Sanganakallu, Maski etc. At Harappa these circular beads varying in

diameter between one-fourth (about 6 mm.) to three-fourth (about 19 mm.) of an inch have a greater frequency. Beads having more than 15 mm. diameter are absent at Nagarjunakonda. The broad uniformity in this bead-type among different groups may suggest some form of contact. At Nagarjunakonda, this seems to be the only evidence, if at all the similarity in bead-type is taken seriously into account, of a trait easily comparable with the chalcolithic cultures of the north, south and the west.

TABLE IX

Classification of beads from different sites

Site No.	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm	13 mm	14 mm	15 mm	Broken	Total
46	1	6	20	13	19	27	12	6	4	2	2	3	2	1	4	122
46-A	—	1	—1	—	1	1	—	1	1	—	—	—	—	—	—	7
47	—	—	—	—	—	—	—	1	—	1	1	2	—	—	—	5
	1	7	21	13	20	28	12	8	5	4	2	4	4	1	4	134

Beads from Harappa display a number of types other than discular or disc-cylinder-circular variety. This is not the case with Nagarjunakonda. It is, tempting to identify them as beads of necklace, or similar ornaments. In fact, two skeletons each with a necklace of steatite beads and two with anklets of paste beads were discovered at Harappa. Needless to say, these beads belong to disc-cylinder-circular varieties. But in the cemetery area of Harappa one such bead was found in each grave-pit for Burials 1 and 2. Almost identical evidence comes from Nagarjunakonda. Human skeleton of Pit 8 of Site 46-A and animal skeleton of pit 54 of Site 46 were each accompanied by a solitary specimen of bead. The occurence of single specimen along with the skeleton may not be without any significance.

The nature of breakage of the steatite bead from Pit 43 of Site 46 may imply the use of some sort of string. The perforations of paste beads often show wear and tear, possibly due to constant friction with the thread. These beads with varied diameters like 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 mm. might have been arranged in descending order on both the sides from the centre of a string. It does not, however, mean that they were only used as beads in an ornament like necklace since the shell-money is kept also in the like manner by the Melanesians and the Indians of California. In shape they do not differ from disc beads recovered from various sites. Foote also identifies a small disc 1·9 cm. in diameter as a currency token such as is used in the Caroline islands and groups in the Western Pacific. Whether disc beads of shell or paste found at Nagarjunakonda or other places were used as money is not easy to find out but the occurrence of uniform bead-type at various sites, widely separated from each other, is suggestive of a standard media of exchange in the proto-historic periods of India.

At Nagarjunakonda, the shell beads were cut out of conch-shell which is of marine origin. Pit 28 of Site 46 disclosed a conch-shell piece. In all likelihood, the neolithic people of this valley might have depended on the supply from outside. Despite the occurrence of one or two conch pieces the total evidence does not indicate local manufacture. They were imported finished products. One of the requisites of the tokens of money is that these should be scarce. Beads made of paste might have fulfilled this criterian as good as shell-money. But there is no tangible proof whatsoever except some indirect evidence to justify the identification of shell or paste beads as a currency token.

The following selected specimens of beads are illustrated: (Pl. LXXIII B).

23	Paste	discular	From Site 46	pit 30
13	Steatite	-do-	-do-	pit 43
17	Paste	-do-	-do-	pit 43
10	Steatite	-do-	-do-	Neolithic straturm.
9-11	Shell	-do-	-do-	pit 1
1 to 3	Paste	-do-	From Site 47	pit 5
20 to 22	Shell	-do-	From Site 46	pit 1B
4	Paste	-do-	-do-	pit 54
8	Shell	-do-	-do-	pit 1b
15-16	Shell	-do-	-do-	pit 27
7	Shell	-do-	From Site 47	pit 3
12	Shell	-do-	From Site 46	pit 27
18	Paste	-do-	From Site 46-A	pit 8
5	Paste	-do-	From Site 46	pit 1
6	Shell	-do-	-do-	pit 10
19	Paste	-do-	-do-	pit 22
14	Paste	-do-	-do-	pit 23
24	Jasper, long-barrel-circular		-do-	pit 47

X. MEGALITHIC CULTURE

A. INTRODUCTION

MEGALITHIC VESTIGES IN THE VALLEY WERE NOTICED BY LONGHURST IN HIS EARLY investigations of 1927. The one burial he excavated was located on the slope of the hill known as *Kshula Dhammagiri* during the *Ikshvaku* period. His casual reference to it as a pre-Buddhist tomb suggests that whatever that was unearthed from it did not seriously interest him. He, however, inferred the existence of more such tombs, the external indications of which he presumed suffered removal by local farmers to facilitate cultivation[1].

Megalithic burrials were systematically investigated in the last and final phase of archaeological activity, primarily designed to salvage the cultural wealth in its entirity. As many as fifteen megaliths out of a total number of twenty one were tackled for an assessment of the cultural traits of megalithism in the valley. Apart from the usual megalithic finds such as iron implements and black-and-red ware pottery, the discovery of thin cylindrical beads of alloyed silver and of gold, and a brass armlet from Megaliths XII & VII respectively are significant features of special interest. The bone remains are too fragmentary universally, to admit of any plausible conclusions from measurements obtained from them.

Megalithic tombs are observed to have been confined to two localities in the valley. (i) On the slopes of *Kshula Dhammagiri* in sector N, V; (ii) the cluster of eighteen megaliths (Fig. 71) in Sector S IV referred to as site No. 63; and an isolated medieval example appeared at site No. 76 in Sector S XII, at a distance of about 325 meters from the southern bank of the river on the western side. But the stone-circle investigated here (Meg. III) does not fit into the generally accepted traits of megalithic burials and hence site No. 76 may not be termed as a megalithic locality.

Thus, excluding Meg. III. the other stone circles are confined to two localities, one minor cluster at site No. 44 and the other major cluster at site No. 63, the distance in between these two being about 2¼ kilometers.

Longhurst excavated a tomb of the minor cluster at site No. 44, as has been already stated. Megalith—I of the present series was situated in this locality. It might have been the place of a few more tombs, but the hill was crowned with a sizable monastery and a stupa over a large rectangular pedastal of rubble stone. In all likelihood some of the undressed megalithic boulders went into this pedastal construction during the *Ikshvaku* period. The external stone circles of a few of the megaliths thus may had suffered complete obliteration leaving no scope to arrive at the total number in this group.

[1] Longhurst A. H., *The Buddhist Antiquities of Nagarjujukunda*, Madras Presidency, Memoirs of the Archaeological Survey of India, No. 54 (Calcutta, 38), p. 7. & plates 2 (c) & (d).

As many as 18 stone-circles were observed at Site No. 63 (Pl. LXXIV A & B and LXXV) of which 13 were excavated. Only Meg. VII is a cist burial and the rest from II to XV are all pit burials. It is not improbable that one or two of the remaining five untackled samples may have had cists in them, but on the whole it was pronouncedly a pit burial cluster. Among other finds Meg. VII, a cist burial, yielded a brass armlet, the only brass sample of these two clusters.

These two megalithic localities were unsuitable to serve as fields of cultivation. Site No. 44 is a hill slope with a steep inclination and a rocky-bed all over. Site No. 63 is again an elevated area with disintegrated calcareous gravel rock under a thin surface humus. The megalithic folk were known to have provided irrigational facilities to their fields and hence more or less to be reckoned as the primitive specialists in agricultural techniques. In general an effort to confine their sepulchural monuments to an uncultivable area is discernible in the megalithic distribution in the valley, as it was usually observed in Megalithic burial patterns.

Megaliths were noticed at many other localities of the Guntur District and the nearest group of megaliths were situated on the other bank of the river at Lohiman *Cheruvu* of Nalgonda District which was excavated partly by the Department of Archaeology, Andhra Pradesh. But unless a complete assessment of the megalithic variations and classification of the Megalithic folk into sub groups of common customs is made, any attempt towards a comparative study is of little value, and reduces to enlisting of numerous sites where similar monuments were either noticed or excavated[1].

B. DESCRIPTION OF THE EXCAVATED TOMBS

Megalith—I

(Fig. 72)

Megalith-I was a cairn-circle with an internal diameter of 5·49 m. built on the southern slopes of the hillock. Unhewn granite boulders were arranged in a circle, part of which alone was extant. Immediately below the cairn, multiple capstone of three slabs placed side by side in north-south direction had been laid across the length of the grave-pit below. The middle slab measured 2·89 m. × ·91 m. the eastern one adjoining this was 2·21 m. × ·91 m and the western slab had been 2·59 m × ·76 m. Average thickness of the slab was 10·2 cm. A rectangular pit measuring 2·57 m. × 1·32 m. and oriented east-west was cut into the hard disintegrated rock to a depth of 1·83 m. An oblong rectangular cist (Pl. LXXVI A & B) oriented east-west with major axis being 100° magnetic had been erected over the floor of the pit. The cist was composed of 4 orthostats, one floor-slab and four small covering slabs (Pl. LXXVII). All were smoothly dressed and belonged to the local brown variety of slate stone. The southern long orthostat measured 2·29 m. × 0·91m. ×

[1] A general idea of the vast distribution of the Megalithic monuments in the south it effectively highlighted by Guru Raja Rao in his thesis which serves as a volume of ready reference, incorporating several recent excavations and explorations including those of Nagarjunakonda.

10·2 cm. The eastern and the western orthostats were placed in between the longer ones in such a way that the ends of the longer orthostats projected laterally. The projection on the eastern side was about 22·9 cm. and on the western side was only 6·4 cm. The eastern orthostat measured 1·22 m. high, ·34 m. wide at base and ·40 m. wide at the emerging portion over the top of the longer orthostat. Its thickness was 4·4 cm. Top of this eastern orthostate leaned 12·7 cm. inwards from the plumb line of the base (Pl. LXXVIII A & B). Further collapse of this slab was not possible, for the builders of the cist had thoughtfully widened the upper portion of it to resist thrust from outside. Similarly, the western orthostat measured 1·10 m. in height, 33 m. in width at the base and ·40 m. at top. It was 3·2 cm. thick. It stood almost vertical with the upper, rising above the tops of the southern and northern orthostats. The floor slab measured 1·70 m. × ·34 m. × 5·1cm. It sloped 5·1 cm. on western end. The floor slab had been inserted within the orthostats over 20·3 cm. thick flooring of gravely earth. After fixing the floor-slab, the cist was retained in position by putting stones against outer bases of the orthostats and 15·2 cm. thick packing of gravely earth.

Inside the cist right over the floor-slab towards east were interred four human skulls along with several long bones (Pl. LXVIII-A). The bones were totally disarticulated. Three iron objects were also kept along with the bones. Outside the cist, over the rammed earth surface raised about 15·2 cm from the floor of the pit, were placed the primary offerings, consisting of 7 pots and a few iron objects and a stone-pestle, along the southern orthostat, and animal bones again on western and north-western sides with iron objects. The stone pestle 27·2 cm. long with 5·1 cm. thick round handle and lower portion of 7 cm. square section was also placed there. Many of the iron objects are corroded; however, shapes of some of these as daggers and knife-blades could be identified. The secondary finds mostly consisted of two human skulls, 15 pots and iron objects, a terracotta spindle-whorl appearing on the southern side of the cist and 1·50 m. long iron lance to the north of the cist. The secondary offerings are all found outside the cist, at the level of the covering slab of the cist, and might have been placed subsequent to the primary burial. Excepting the bigger red-ware pots, the pottery was of usual black-and-red ware megalithic type, consisting of bowls, vessels, dishes, etc. No stand has been found in the pottery from this megalith. Interment of bones with the offerings on more than one occasion, as evidenced from this megalith, was also observed in the second cist-circle Meg. VII and in some other pit-circles in the valley. The cist was covered with four slabs placed side by side. With the exception of the one almost rectangular cap-stone kept at the western end, all the other three were of irregular shape. Small slab-pieces were kept below these slabs over the ends of orthostats to obtain a uniform level. The slabs varied in diamensions. The smallest was ·54 m. × ·39 m. and the biggest had been ·66 m. × ·46 m. The cist had been covered with a deposit of brown earth upto the brim of the pit. Two different compositions in the filling deposit were noticed. The lower one to a depth of ·46 m. touching the cist consisted of hard brown earth with occasional whitish *kankar* pieces and the upper deposit about ·61 m. thick was comparatively softer. Subsequent to this filling, the pit had been sealed with three capstone slabs, placed across the length of the cist and covered by rubble.

Megalith—II[1]

This pit-circle at the south-western extremity of site 63, measures 6·03 m. internally and was built of heavy unhewn granite boulders (Pl. LXXIX A&B). Rubble packing was noticed only at the fringes and perhaps served to support and keep the boulders in position. A rectangular pit in the centre measuring 2·39 m. by 1·14 m. was carried down to a depth of 1·83 m. It was cut into the hard granitic disintegrated rock (Pl. LXXX A & B) and was oriented north-south with longer axis being 9°30′ magnetic. No trace of occupation of the site prior to the construction of this megalith was available.

In the central area of the grave-floor, over a 7·5 cm. to 10 cm. thick ashy bed lay disarticulated human bones, with the skull towards north. The facial region of the skull got badly crushed perhaps under the weight of the filling of the pit (Pl. LXXIA). A little clay appeared to have been mixed with ash to harden the bed right below the skull. The burial was doubtlessly of a secondary nature, but the builders of the tomb had taken enough care for arranging the bones in natural position. Some stray pieces of skull were found between the femoral bones. Teeth were also found lying scattered near the long bones as well as around the skull. Occurence of more than usual number of teeth and more fragments of long bones enable us to infer that the skeletal remains belonged to more than one adult individual.

The grave furniture consisted of 10 pots, of which two are red ware water pots, four high stands of hour-glass type for carrying dishes or bowls along with a 1·70 m. long iron lance, placed horizontally on the left side of the skeleton. Another lance or a spear about 1·52 m. in length had been vertically kept along the southern edge of the pit, but got tilted in the course of filling. Iron objects were possibly the weapons belonging to the deceased. The other iron objects are two barbed-and-tanged arrow-heads, an oridinary arrow-head, a tanged dagger, a fragmentary knife, a wedge, another dagger and an implement appearing like a plough share. Many of these objects were completely corroded and in the process of getting powdered.

Bones were covered again with ash varying in thickness from 15 cm. to 23 cm. The pit was subsequently filled with stones and earth to a height of 1·06 m. from the centre of the pit floor. This earth for filling was imported from somewhere also, for the soil dug out from the pit should have been composed of mainly granitic *kankar*. The pit was finally filled with compact stones and earth which spread laterally towards the stone-circle, as represented by layer (2) in the section. No evidence was available to show that the pit had been used on more than one occasion for subsequent offerings, the only exception being an iron lump of indeterminate shape found at the top of layer (3).

Megalith—III

(Fig. 73)

This was located to south-west of site 63 and is about 2·15 m. from the river bank. Close to this stone circle was a field full of pits and there are many fragments of medieval pottery and animal bones associated with them.

[1] *I. A. R.*—1958-59, p. 7 (for section and drawing).

From outward appearance this megalith is a stone circle of 4·27 m. internal diameter. An oval pit measuring 1·67 m. x 1·37 m. was dug to a depth of ·91 m. At the the bottom of this pit were noticed a few bones probably of a bovine animal but associated with no pottery. The pit was filled with white gravelly earth and small stones. The stones used for the outer circle are comparatively smaller in size and were dressed in contrast to the usual unhewn heavy boulders met with at Megalithic sites. Moreover, a stone enclosure 3·28 m. had been added to the stone-circle on its west (Pl. LXXXIB).

Megalith—iv

(Fig. 74)

It is the largest pit-circle, built of huge untrimmed boulders with 9·15 m. internal diameter. Rubble packing inside the circle consisted more of white quartsite stones (Pl. LXXXII A & B). A rectangular pit 3·05 m. x 1·22 m. was dug into the hard granitic rock to a depth of 2·37 m. It was oriented to east-west with longer axis being 270° 30' magnetic.

Right on the rugged floor of the pit, towards north-east corner lay a couple of unidentified small splinters of bones, perhaps belonging to an animal and an iron object of indeterminate shape 36 cm. long and 2·5 cm. thick. These were the only finds recovered from the bare rocky floor of the pit over which no ashy bed had been laid. It was devoid of pottery or any other furnishing goods. Absence of grave furniture is difficult to explain particularly in view of the enormous labour and material that went into the making of this grave. Suggestions were made earlier by Wheeler that such structures could be macerating pits or 'an inverted tower of silence' and by Dr. Banerjee that it may be due to an accident, are of little help to us in understanding this megalith[1]. It is suggested in this connection, in view of the large dimensions of the pit-circle that has been constructed, that this Megalith could have been the vault of an influential family or tribe and members of this family while migrating from the valley carried away the remains of their ancestors along with their other moveable property. Since it was considered sacred it was moved to their new habitat, where they might have enshrined them in a new special edifice.

The pit had been filled with stone and greyish alluvial earth brought from a different site. This feature was also noted at Brahmagiri[2] pit-circles. Fragments of a dull red-ware jar were found in the filling at a height of about 1·83 m. from the floor of the pit. The fragments were lime-coated. The jar had a small flat base and the shoulder had been decorated with an applied slip bearing half finger-tip impressions. These sherds had possibly been deposited along with earth filling. The most outstanding feature, was a hole measuring ·61 m. by 11·4 cm. and cut into the top of filling, near the western edge of the grave pit. The hole had been filled with white lime. This hole was first suspected to have been a disturbance caused by the roots of the shrubs that grew all over the megalithic area, but

[1] Ancient India, No. 4. Brahmagiri, page 197 ; and No. 12, p. 27.

[2] *Ibid.*, No. 4 page 196.

this explanation has to be abandoned on the discovery of a similar hole in the neighbouring megalith No. VIII and occurring in correspondingly same location. The hole might have a ritualistic association. The rubble packing was more compact towards the fringe of the stone circle at a varying distance of ·90 m. to 2·15 m. from it. The huge boulders were retained in position by the same rubble packing.

This megalith was stratigraphically linked with one of the lime stone pillars on its west which form part of a cluster of memorial pillars datable to the *Ikshvaku* period, which are found to be later in date than the megalith.

Megalith—v

(Fig. 75)

It is a pit-circle with loose rubble-packing on top bounded by a stone-circle of 6·79m. internal diameter. The circle was formed of unhewn granite boulders and a few of them on the west were found missing, leaving the rubble packing below intact. The cairn-packing on the north and south extended beyond the limits of the bounding circle.

The pit, oriented to north-south with major axis being 10°30' magnetic was almost rectangular on plan measuring 2·74 m. by1·01 m. Its south-eastern corner had been slightly truncated: presumably because of the roughness of the rock, cutting at this spot was abandoned. It was dug into the hard granitic rock-underlying a ·60 m. to ·90 m. thick deposit of whitish natural gravel. Floor of the pit 2·01 m. deep sagged lengthwise in the middle.

The unevenly sagged floor of the grave-pit, had been levelled by spreading a bed of ash to a maximum depth of ·31 m. Over it lay the disarticulated human bones presumably belonging to more than one person with the skull towards north. Facial portion of the skull was badly crushed under the weight of filling and some teeth lay scattered near the mandible. The skull resting on the right parietal region, faced slightly towards east. All long bones, borken and fragile, had been indiscriminately jumbled together. Ribs and phalanges were lying adrift and the pelvic bone had been found totally decayed (Pl. LXXXIII). These bones appeared to have belonged to an adult, male.

The grave furniture consisted of 24 pots and 2 iron objects. Along the eastern edge of the grave pit were placed, 6 water-pots, 3 stands of hour-glass type and one black-and-red ware dish. Most of the grave pottery was laid alongside the western edge of the pit, which included 6 stands, 4 dishes, 3 pots and 2 bowls. A 106 cm. long iron lance was obliquely kept on its butt with the head leaning upwards along the southern side of the pit. An iron wedge stuck to the eastern edge. All the furnishing goods had mostly been laid over the ashy bed along with the bones. The pit was finally filled with greyish alluvial earth mixed with stones, brought from somewhere else. The filling spread laterally over the edges of the pit to an average thicknes of 12 cm. to 15 cm. The rubble packing bounded by the stone-circle had been put over the filling.

Megalith—vi

(Fig. 76)

This was a pit-circle with 8·08 m. internal diameter covered by a Cairn packing fairly compact and retained by a circle of huge untrimmed granite boulders (Pl. LXXXIV A & B).

A roughly rectangular pit measuring 3·20 m. × 1·52 was cut into layer (4). The pit was positioned more towards the southern half of the circle. It was the most spacious of all the grave-pits of the Nagarjunakonda megaliths and had been carried down to a depth of 2·74 m. It was oriented east-west. The sides of the pit had been undercut, perhaps to accommodate more grave-furniture.

A 15 cm. thick bed of ash was spread on the rugged surface of the pit-floor, over which had been laid the disarticulated human bones. Three fragmentary human skulls lay almost at the major axial line over the ashy bed. The middle skull and the one at the eastern end perhaps belonged to two different male adults but the identification of the third one on the western side was doubtful. The long human bones found almost at the level of the skulls also belonged to more than one person. The offerings alongside the pit were noticed to have been placed on three different occasions. The primary ones were laid along with the human skulls and other bones over the ashy bed. They consisted of 15 pottery pieces and one iron object. Counting from the south-western corner along the southern edge of the pit were placed two Black-and-red ware bowls placed one above the other; four pots; one iron dagger; an open vessel a black-and-red ware deep bowl; a big jar at south-eastern corner; a black-and-red ware deep bowl near eastern edge.; one pot, three vessals and a pot along the northern edge. A 10 cm. thick deposit of silty earth covered the skulls and the offerings. Over this deposit some animal bones and offerings consisting of three pots, one vessel and one iron object (dagger ?) alongside the southern edge, and four pots near the northern edge, of the pit were placed. These second offerings were again covered by a deposit of greyish silty earth, and third offerings had been arranged. They include 2 stands at the western side, both 60 cm. higher than the skull one pot on the southern side one pot on east; and one pot along the northern edge. The pit had then been filled with fine grey earth full of lime specks and a few stones (Layer 4-B), to a height of 1·87 m. from pit floor. The final filling over it upto the brim of the pit was composed of coarse greyish earth and more of rubble (Layer 4-A). This filling had again been sealed by a floor of roughly dressed stones measuring 3·97 m. × 3·82 m. The flooring was covered with 38 cm. thick deposit of yellowish earth mixed with lime specks (layer 3). This deposit had thinned out towards stone circle. Layer 3 was sealed by layer 2 composed of yellowish silty earth and rubble.

The cairn was retained by a Circle of huge and heavy granite boulders. Layer 2 had subsequently been disturbed by a pit cut into it, that measured 2·14 m. × 1·37 m. It was perhaps dug by farmers later to obtain the yellowish silty earth which resembles very much yellow ochre used generally for colouring the walls of their houses.

MEGALITH—VII
(Fig. 77)

It is a cist-circle with multiple capstones representing almost the same type as that of Meg. I excavated earlier in 1957[1]. Internal diameter of the stone circle laid in unhewn

[1] IAR—1956-57, p. 2.

granite boulders measured 4·88 m. east-west and 5·49 m. north-south. Scattering of heavy rubble on surface within the circle did not extend towards centre. Two compjete capstone slabs of brown quartzite and one broken on extreme east were placed side by side in north-south direction across the length of the cist below (Pl. LXXXV A & B). They appeared only in the eastern half of the circle and those on the western half were found to have been robbed or removed by cultivators since they impeded the movement of their plough. One of the removed capstone slabs had been found outside the megalith towards east. It was very clear from the stratification that the removers of the capstone slabs on west had disturbed this megalith down to the top of the cist, but did not open the cist. A broken piece of capstone was found obliquely fallen inside the cist. Scattering of rubble originally intended to cover the capstone slabs was partially denuded by later distrubances. It may be reminded here that capstone slabs in the cist-circle Megalith—I at site 44 and in the pit-circle Megalith IX at site 63 had also been covered by rubble scattering.

The first capstone slab measured 2·39 cm. long ·67 m. wide and 15·2 cm. thick. On the upper side towards northern half of it was carved a rectangular pattern 22·9 x 20·4 cm. which had been bisected horizontally by another line. The carving was done in almost half-an-inch thick line of nominal depth. Such petroglyphic carvings had also been noticed on the capstone slabs in the pit-circle Megalith-II. The adjacent slab on east measured 2·62 m. and the one lying outside the stone circle was 2·37 m. x ·44 m x 25·4 cm. No evidence regarding occupation of the site prior to the construction of this megalith had been available. On the other hand it had been noticed that pit circle, Megalith-VI, on its south-west was built later, for the pit of that megalith was cut into layer 4 which had struck against the circle stones of the cist-circle under review.

A roughly rectangular pit measuring 2·79 m. x 1·37 m. oriented east-west was cut to a depth of 1·72 m. into the hard brown granitic rock. The oblong cist was rectangular in plan oriented east-west with major axis being 97°30'. The cist had been built right over the pit-floor. Smoothly dressed slabs were used in its construction, of which four were upright orthostats, one floor slab and three pieces of covering slabs. The floor slab measured 1. 80 m. wide on western end and 46 m. on eastern end. Eastern end of the floor-slab was 5 cm. lower in level than the western and was 5·7 cm. thick as compared to 3.2 cm. at western end. Arrangement of orthostats had been skilfully designed. Lower ends of the four orthostats had been directly placed over the floor of the pit. To prevent inward collapse of cist, the eastern and the western orthostats were erected inside the longer ones, the ends of which projected 20 cm. to 22·5 cm. laterally. The long orthostats measured 2·29 m. x ·91 m. high and 7·89cm. thick each. The inner side-slab on east was ·46 m. wide at bottom, ·47 m. at the level of the top of longer orthostats, ·50 m. a level ·25 m. higher, and ·25 m. wide at the top. Similarly the western side-orthostat had been ·48 m. wide at base, ·47 m. the level of the top of long orthostats, ·61 m. at a level ·25 m. higher from here and ·25 m. wide at top. The eastern side-orthostat was 5·1 cm. thick and the western one was 3·2 cm. (Out of the total height of 1·30 m. from the floor of the cist, top of the side-orthostats projected and widened upper half of these side-orthostats emerged ·64 m. higher from the top of the longer orthostats). The emergent and widened upper half

of these side-orthostats measured 2·29 m. long x ·91 m. high x 8·9 cm. thick. The floor-slab was placed ·66 m. below the top of these two orthostats. This arrangement of orthostats in the cist was quite different from those found at Brahmagiri. Structural details of the cist show that first of all the four orthostats were erected over the floor of the pit in roughly desired position. Then fine yellow earth was rammed inside to a height of 20 cm. at the bottom. Over this raised base had been inserted the floor-slab. Having done this, all round its exterior a packing of earth and rubble was put to a height of ·31 cm. to 36 cm. over the pit-floor. This packing had kept the cist in form by pushing orthostats inwards (Pl. LXXXVI A).

Right over the floor-slab were interred two human femurs. Close to the western end of the femur lying along the southern orthostat, had been placed a brass armlet of 7·6 cm. diameter made of a 5 mm. thick rod (Pl. LXXXVI B). The human bones and the brass armlet were covered with a 7·6 cm. thick deposit of soft grey earth over which had been laid a few animal bones with some skull pieces. The cist had then been filled with soft yellow earth and finally covered with three small slabs of 1·9 cm. average thickness. The middle covering-slab was found to have been removed by subsequent treasure-seekers. The primary offerings which appeared to have been directly placed over the packing around the cist on a level approximately 36 cm. above the pit-floor was a pot on the east; three pots on the north; black-and-red dishes and a bowl and 13 pots—two pots on west with an animal bone near them; and animal bones on south. The secondary offerings outside the cist kept over the filling earth about 20 cm. higher than the lower offerings consisted of an iron wedge and two other objects on the northern side, five pots—and a few fragments of human (?) skull and bones near the 4th pot. The pot in north eastern corner was the highest in level i.e., 20 cm. above the level of covering slab. A pot lay right over the north-eastern corner of the covering slab and a Black-and-red ware bowl placed over the covering slab at the south-western corner (Pl. LXXXVII). These three were probably the last offerings placed after covering the cist. It was surprising to notice that no stand had been found in the grave furniture in this megalith, whereas it was of common occurrance in the pit-circles.

The cist was burried under a filling of earth which almost touched the brim of the pit but sagged in the middle (Layer 4). Over this was a deposit of brown earth and stones (Layer 3) on which the capstone-slabs had been placed juxtaposed. Layer-2 composed of dark muddy earth and rubble had finally covered the capstone-slabs and stone-circle was arranged along with it.

Megalith—VIII

(Fig. 78)

It is a pit-circle with 7·42 m. internal diameter and of unhewn granite boulders[1] (Pl. LXXXVIII A & B). The cairn-packing consisting mainly of white quartzite stones,

[1] Structurally this megalith was built later than the adjoining Meg. IX towards south-west, for the cairn stones of the former had actually sealed some of the circle-stones of the latter. Moreover circle-stones of Meg. IX rested on a lower level and one of these had been partly covered by a circle-stone of Meg. VIII.

was more compact only within a range of 60 cm. to 90 cm. from the stone circle. An almost rectangular pit 3·05 m. by 1·37 m. oriented east-west with major axis being 87° magnetic was sunk into the hard bluish granitic rock to a depth of 2·14 m. A 12 cm. to 15 cm. thick bed of ash had been spread over the rugged surface of pit-floor and in the middle portion were laid a few splinters of human (?) bones. The grave-goods consisted of 14 pots and 6 iron objects, all kept along the pit-edge. Along the western edge of the pit lay 5 pots and two iron objects. A 1·83 m. long iron lance had been horizontally laid with the blade touching the north-western corner of the pit and the butt end touching the northern edge of the pit at midway. Another iron object looking like a dagger, had been kept near the blade of the lance, and overlay portion of the pot. Most prominent of the grave-furniture in this pit had been a big red-ware jar placed at the south-western corner of the pit. The rim of the jar measured 36 cm. in diameter. On its shoulder are two parallel bands decorated with finger-tip impressions. There were 3 pots and 2 iron objects, a dagger and nail lying along the northern edge of the pit. Along the southern edge lay 4 pots, one iron wedge and a tanged-and-shouldered iron dagger. A terracotta spindle whorl was also found at the south-western corner of the pit.

The grave-furniture was covered with greyish silty earth (Pl. LXXXIX A & B) and stones which appeared to have been imported from a different site. The filling spread, laterally over the ancient ground-surface to a thickness of 20 cm. to 25 cm. covered a few cairn stones of the adjoining Meg. IX, thereby indicating that the latter Megalith was completed earlier.

Another notable feature in this Megalith was an obliquely cut hole measuring 46 cm. deep by 7·6 cm. wide into the top of the filling. The hole was filled with white lime but its exact import is not known.

MEGALITH—IX

(Fig. 79)

Although this Megalith was a Cairn-circle from outward appearance, it revealed, on further examination a multiple capstone of 7 slabs covering a usual rectangular pit below (Pl. XC A & B). Diameter of the stone-circle laid in unhewn granite boulders internally measured 5·49 m. north-south and 5·99 m. east-west. A roughly rectangular pit 2·74 m. × 1·22 m. oriented nearly east-west with major axis being 299° magnetic, had been carried to a depth of 2·22 m. into the whitish gravely earth below (Pl. XCI).

Right over the uneven surface of the pit floor, a lime bed 5 cm. to 7·5 cm. in thickness was spread, in the south-western corner of the pit lay a portion of an animal jaw with teeth and few small bones. No human bone was available. Four stones had been arranged over the lime bed, in a row along the southern edge of the pit. They were laid at intervals varying from 10 cm. to 45 cm. Only one stone towards north-eastern corner was placed on the opposite side of the pit-floor. The primary offerings lying directly over the lime-bed, consisted of two black-and-red ware bowls, a high red-ware stand of hour-glass type and an iron dagger. A greyish silty deposit 15 cm. to 22·5 cm. inches thick mixed with lime

specks covered all the primary offerings (Pl. XCIIA & B). This deposit also sealed the five stones arranged on the lime-bed. Over this silty deposit had been placed the secondary offerings that included four stands two black-and-red ware dishes, five black-and-red ware bowls, three black-and-red ware basins, four water-pots and six iron objects including 2.14m. long by 2·5 cm. thick lance and two knife blades. All these offerings had been covered by a yellowish silty filling (layer 2 in section), brought from a different site. A pot found in this filling at a level 88·5 cm. higher from the pit-floor perhaps indicate final or third offering.

After filling the pit 7 cap-stone slabs were placed over it in almost north-south direction across its length. Beginning from west, the first capstone slab measured 1·73 m. long × ·57 m. broad × ·31 m. thick. The second one 2·64 m. × ·83 m. × .36 m. depicted a hollowed out figure of an animal, possibly a bull with a hump and two horns. The figure had been carved on the vertical face of the slab touching the third slab. The figure, 22·5 cm. long and 15·2 cms. high faced north. It is evident that the figure had been completed before placing the capstone slabs in position, for it would not have been possible to chisel on the vertical face, with the slabs kept *in situ*. Third and the fourth slabs measured 2·85 cm. × ·53 m. × ·39 m. and 3·00 m. × ·61 m. × ·26 m. respectively. Fifth, sixth and seventh slabs measured 2·27 m. × ·41 m. × ·26 m. ; 1·98 m. × ·36 m. × ·24 m. and 1·14 m. × ·67 m. × ·28 m. respectively.

Over the northern half of the fourth slab-top appeared in petroglyphic a figure crudely depicting possibly a horse, with a rider within a space of ·69 m. × ·53 m. Similar carvings on the southern half of the slab presented figures of indeterminate shapes (Pl. XCB). It may be recalled that carving of some features was also noticed on one of the capstone slabs of the cist-circle, Megalith VII.

Megalith—X

(Fig. 80)

This pit-circle which lay to the south-west of Megalith XI, is found of hewn and unhewn granite boulders, has an internal diameter of 7·02 m. east-west and 7·93 m. north-south. Rubble packing inside was more compact along the stone circle and was loose (Pl. XCIII A & B) at the centre. The pit was almost rectangular in plan and measured 2·44 m. by 1·14 m. and oriented to north-south with longer axis being 354 magnetic. The pit was cut into hard granitic rock, greenish in colour, to a depth of 2·04 m.

This grave also contained a secondary type of burial. Only a few disarticulated bones, very fragile and crumbled laid on a bed of fine earth spread to a thickness of 15·2 cms. over the uneven surface of the pit-floor. Slightly towards the south-west. Two long iron spears with heads were kept towards south, one above the other crossing each other at a narrow angle and lying 7·6 cms. over the level of the bone. Two other small iron objects were found sticking to the eastern edge of the pit a few Cms. above the level of the pots.

16 pots in total were found in the pit, out of which 7 lay along the western edge and 9 along the eastern edge. Pottery on the western edge consisted of 4 red-ware pots, 2 black-and-red ware dishes and a high stand of hour-glass type. Some of them covered the bones and one was laying away from them at a slightly higher level. The ceramic

pieces along the eastern edge of the grave include 2 black-and-red ware bowls, perhaps originally kept over a stand (now fallen), 5 red ware pots and a big red ware jar having rim of 25·4 cms. diameter. The jar and the other pots got badly smashed under the weight of the filling which contained heavy stones thrown over the pottery level.

The filling of the pit reveals two types of material, the lower composed more of lime and earth to a thickness of about 1·52m. and the upper greyish alluvial earth mixed with lime specks imported from elsewhere. A few pot-sherds of Black-and-red ware of indeterminate shape were also picked up from the filling of the pit. Over this filling, rubble packing was laid as a protection against monsoon and the stone-circle was built finally to retain it.

Megalith—xi

(Fig. 81)

It is also a pit-circle located at the eastern end of Site 63. The stone-circle was made of untrimmed granite boulders and its internal diameter varied from 3·66 m. to 3·74 m. Thick cairn packing appeared prominently within and partly without the stone-circle (Pl. XCIVA). The central grave-pit was roughly rectangular in plan measuring 2·49 m. by 1·22 m. and had been oriented to north-south with longer axis being 10° magnetic. The grave-pit had been dug to a depth of 1·60 m. It was cut into the granitic rock. On rugged surface of the pit floor, fine earth and lime was spread to a height of 15·2 cms. to 22·7 cms. to provide bed for the bones, perhaps skeletal remains of the individuals collected and arranged after excarnation. This uneven bed sagged in the middle thus lifting the position of the long bones near the eastern and the western edges of the pit 15·3 cm. higher than those in the middle.

The disarticulated human bones appear to belong to two persons as indicated by the recovery of two skulls and other bones of more than one adult (Pl. XCIVB). The skull 'A' towards north was found crushed under the weight of filling. It was resting on its right lateral side with the cortex pointing west and frontal portion towards south. Two molars and two premolar teeth lay in the sockets of the right maxila. This skull and the condition of the long bones lying along the western edge of the grave-pit showed that they belonged to a well-built male adult while those laid along the eastern edge of the pit with the fragmentary skull 'B' placed in the middle were probably of another adult. Only a few pieces of the skull 'B' available. No jaw or teeth could be found with it. A terracotta spindle was also recovered were from below this skull. General state of preservation of the bone on the eastern side was comparatively better than those on the western side.

As many as 13 pots were placed in the pit. A black-and-red ware bowl had been kept at the bone-level close to the northern edge of the grave. 9 pots lay along the western edge. They included the black-and-red ware dish, a red ware stand of hour-glass type and water-pots. Three pots were arranged along the eastern edge. Only one iron piece, presumably a wedge was found sticking to the eastern side of the grave pit right over the bones. Some of

the pots lying over 30 cm. filling that covered the bones indicated that there was a time gap between the interment of the bones, and the completion of funerary ceremonies.

Megalith—XII

(Fig. 82)

This pit circle consisting of a stone-circle of 5·64 m. internal diameter and built of unhewn granite boulders, contains a rectangular pit measuring 2·52 m. × 1·09 m. oriented north-south with the major axis being 12° magnetic, cut into the greenish hard granitic rock to a depth of 2·52 m. below. An ashy bed, 2·5 cms. to 5·0 cms. thick had been spread on the pit-floor, over which human bones were laid. This disarticulated bundle of bones, placed towards northern half of the pit-floor consisted more of long bones and a fragment of a lower jaw. A few teeth were also recovered but the skull was absent. The bones appeared to have belonged to one young adult. Three stones of irregular shape were placed in a row to the west of bones, parallel to the western side of the pit and three were correspondingly arranged on the opposite side parallel to the eastern side of the pit. Unlike those found at Brahmagiri,[1] no symmetry was followed in the arrangement of these stones around the bones. Distance from one stone to another in the same row differed from 30 cms. to 80. cms The only significance that could be attached to these stones would be that they demarcated the central area specified for the interment of bones. The furnishing goods consisting of iron objects and pottery had been kept outside this line of demarcation. An iron lance 1·22 m. long and 2·5 cms. thick was laid parallel to the western side of the pit and an iron dagger was placed near the southern end of the lance. A black-and-red were dish, a bowl and a red-ware high stand were placed to the west of bones touching the iron lance. Bowls and an iron wedge lay in the north eastern corner of the pit. Stands with a black-and-red ware dish were placed near the eastern side of the pit. The dish had apparently fallen from the stand on the demarcation stone in the process of filling the pit. Thus three iron objects and eight pots in total were intended to be placed with the human bones in the primary offerings. One pot along the eastern side of the pit and another in the north-western corner were placed on a 7·6 cms. thick bed of ash and lime, marked as layer 3c in the section, spread over the ashy layer 3d on which bones and primary offerings were kept. The time interval in placing the offerings of these two pots could perhaps have been only a few days.

The primary and secondary offerings had been covered with a 30 cms. thick deposit of grey alluvial earth represented by layer 3b in the section (Pl. XCVA). Over this deposit lay a completely articulated skeleton of a bovine animal on its right side with legs towards west, back touching the eastern side of the pit and face placed in the north eastern corner of the pit (Pl. XCVB). Head of the animal was slightly raised with mouth turned upwards.

[1] It may be recalled here that at Brahmagiri, four stones were kept on the pit-floor which according to Wheeler held legs of a bier.

Horns had decayed. The skull cap had been cut slightly above the upper teeth portion on the *alveclar* margin. This clear cut-mark suggests that the animal was sacrificed soon after the human bones and offerings were placed at the pit bottom. Legs of the animal were semiflexed. It appeared to be fully grown-up animal with probable height of 1·30 m. from hoofs to back and length of 1·98 m. from tail to forehead. The only offering kept with this animal had been a pot in the south-western corner of the pot. The animal had been covered with a 30 cms. deposit of greyish alluvial earth mixed with lime specks and occasional stones represented as layer 3a in the section. Over this layer a bed of rubble had been spread towards northern extremity of the pit over which lay a skeleton of another small animal in east-west direction with head towards west. The bones were much decayed and fragile. It is fully articulated, lying on its right side with back touching the northern side of the pit, head in the north-western corner and tail towards east. The legs towards south were bent at a narrower angle than those belonging the bigger animal buried below this. The skull had not been found but few fragments of the lower jaw and a few teeth were available. No pottery or any other offering appeared to have been made for this animal.

The second animal had been covered with grey alluvial earth mixed with small stones and imported from a field or a tank for filling the pit (layer 3 in section). This filling spread laterally over the brim of the pit to a height of 15·2 cms. to 22·8 cms. The central portion of the filling marked as layer 2 in section and measuring 1·98 m. deep 1·22 m. wide was composed of compact rubble. scattering of rubble appeared both inside and partially outside the stone circle.

This megalith presented a new feature of animals being sacrificed and buried along with the bones of the deceased in the burials at Nagarjunakonda.

Megalith—XIII

(Fig. 83)

It is a pit circle to the south of Megalith XII. Diameter of the stone-circle made of untrimmed granite boulders internally measured 5·49 m. north-south and 5·95 m. east-west. Scattering of smaller rubble with earth appeared within the circle of which three boulders from south-west and one from north had been displaced subsequently, thereby exposing the rubble-packing below. The rectangular grave-pit 2·57 m. at bottom and oriented north-south with the longer axis being 352° magnetic, was carried down into the hard granitic rock to a depth of 2·27 m. below (Pl. XCVIA).

The rough floor of the pit was covered with 10·2 cms. to 15·2 cms. thick bed of ash and fine earth over which the primary offerings and human bones were laid. As usual this is an excarnation burial. All the bones were too fragile to handle. They appeared to have belonged to an adult male consisting of a few fragments of a skull (without any teeth) placed towards north, two femurs, one tibia, two ulnae, one clavicle, two radii, two fibule, pieces of pelvic bones, few ribs, metacarpals and a few pieces of phalanges.

Pottery placed at two different levels in the pit along its edges suggests that the

offerings were deposited on two different occasions(Pl. XCVIB). The first group of pottery was kept at the level of bones and the second one lay over a 15·2 cms. to 31 cms. deposit of fine greyish silty earth mixed with stones and lime covering the primary offerings below. Out of the total number of 20 pots, 9 were kept in the primary offerings which lay over the ashy bed spread over the pit-floor. Two high stands carrying black-and-red ware dishes in red-ware placed along the western side of the pit and three red-ware pots were also placed along the same side of the pit. Only one black-and-red ware dish lay along the southern side and another near the eastern side. The secondary offerings consisted of a lump of iron and 11 pots were red-ware water pots and one stand on the southern side. The solitary iron object was only a lump of indeterminate shape which lay over the edge of a stand and touching a pot on western side.

The pit after depositing the secondary offerings was filled with grey alluvial clay with lime specks and stones. Over this filling layer had been built the stone-circle within which small rubble mixed with earth was finally scattered to cover the tomb and protect it from erosion.

Megalith—xiv

(Fig. 84).

It is a pit circle with rubble packing bounded by a stone-circle of untrimmed granite boulders. Internal diameter of the circle measured 5·95 m. north-south and 5·18 m. east-west. A couple of boulders of the circle had been disturbed on the northern side. Spreading of small rubble within the circle was very loose and appeared only near the stone-circle.

A rectangular grave-pit measuring 2·52 m. by ·84 m. has been dug into the hard whitish granitic rock to a depth of 1·55 m (Pl. XCVII A & B). The pit was oriented north-south with major axis being 356° magnetic. This was the narrowest pit in the megalithic series. An ashy bed 2·5 cms. to 7·6 cms. thick was spread over the rugged surface of the pit-floor over which the dead body was placed with head towards north. The skeleton was lying extended on its left side facing east. It is 1·57 m. long and had been oriented north-south with the major axis being 358° magnetic. The skull, though badly crushed (Pl. XCVIIIB) had also faced east. The state of preservation of the bones in general was poor and as they were very much decayed it was not possible to lift them. The hands were completely extended and were touching the pelvic region. The body was buried with some pieces of jewellery on it. One spiral ear-ring fallen from the right ear-lobe was found lying close to the right *mastoid process* over the ashy-bed. The left ear-ring was lifted from below the left ear-lobe spot, as this side of the skull was resting right over the ashy-bed. 53 small cylindrical beads were removed from the earth sticking around the neck region of the skeleton. Out of these, 35 were of gold and 18 were of silver spacing beads. The skeleton was perhaps of a wealthy lady and the jewellery worn by her had not been removed at the time of interment of the dead-body (Pl. XCIXA).

The dead-body was covered with ash which rose only to the height of the right (upper)

shoulder. Over this covering some bones possibly belonging to some animal were kept near the western edge of the pit and about 25·4 cms. away from the thigh bones. A few splinters of animal bones also appeared to the east of the thigh bones and some towards north-eastern corner of the pit, almost over the skull. The grave-furniture placed around the skeleton at the level of the animal bones consisted of 13 pots and 2 iron objects (Pl. XCVIIIA). Starting from the south-western corner and counting the offerings along the western edge of the pit, the first one was a thick red-ware stand and the other one a complete red-ware water-pot. The pot close to the stand was perhaps originally placed over it but had subsequently fallen from it in the course of filling, pots and a black-and-red ware dish were badly crushed. No offerings had been laid along the northern side of the pit. Along the eastern side lay a pot at the north-eastern corner. Next were placed black-and-red ware deep bowl; pot almost over the pelvic region of the skeleton; pots and dish which had presumably fallen from stand at south-eastern corner. This stand had collapsed over a pot. Dish had fallen on its side with the rim touching the eastern edge of the pit and its bottom towards west. An iron lance 1·47 m. long by 2·5 cms. thick had originally been placed alongside the eastern edge of the pit over the pots with its blade towards south. While filling earth was being thrown from the top, a stand collapsed towards north and a dish fell down leaving part of the blade of iron lance resting over the rim of the stand; bowl had similarly been noticed titled sideways. An iron wedge 17·5 cms. long 7·6 cms. broad at sharp edge and 6·4 cms. at butt was found behind lance along the eastern pit-edge.

The offerings were finally covered with filling of brownish grey alluvial earth and stones imported from a different site. Over this scattered filling of rubble and the stone-circle had been arranged.

Megalith—xv

(Fig. 85)

It is a pit-circle with cairn packing. The stone circle of unhewn granite boulders, measuring about 4·27 m. in internal diameter, was found totally disturbed (Pl. XCIXB). Six boulders on east and one only on west were in their original position. As the circle-stones were dislodged, the cairn packing inside was washed away by rain and was reduced to a few loose patches.

A roughly rectangular pit measuring 2·61m.x ·91m. was dug 1·70m. deep into the hard granitic rock. The grave-pit oriented east-west with major axis being 106° 30′ magnetic. The bare rock appears to have been exposed prior to the digging of the grave-pit. Over rugged surface of the pit-floor a 15·2 cms. thick bed of ash mixed with white lime was spread. On this bed lay an articulated human skeleton, fully extended in east-west direction with skull towards east. The dead-body had been laid on its left side facing south. Arms were folded and rested on the chest. The skeleton 1·52 m. in length was possibly of an adult female. The primary offerings lying with the skeleton along the southern edge of the pit, consisted of 4 red-ware pots, a black-and-red ware dish and an iron dagger. The skeleton

and the primary offerings had been covered by a 23 cms. to 30 cms. thick deposit of greyish alluvial earth and stones. Over this deposit were laid the secondary offerings consisting of 4 red-ware waterpots, one stand and a black-and-red ware dish. The pottery in this pit was badly crushed under the weight of filling (Pl. XCIX C). The pit was then filled with ·99 m. deep greyish alluvium mixed with stones. The filling did not extend beyond the brim of the pit. It was finally sealed by a 10 cms. to 12·5 cms. thick deposit of yellow earth and cairn, which had been much disturbed.

The following Iron objects are Illustrated; (Fig. 86)

1. Adze of truncated triangular form and longitudinal section, core disintegrated by oxidation. From Meg. I, outside the cist.

2. Similar to the one above but less pronouncedly converging longtudinal edges and convex butt-end. From Meg. V.

3. Similar to the No. 1 above, much worn-out and broken working edges. Oxidized core affected the section, resulting in a swollen working edge and gradually flaked-out butt-end rendering it thinner. From Meg. VIII.

4. Adze of truncated triangular form with the base replaced by a pronouncedly convex working edge; suffered oxidation of the surface but preserving an unaffected core of relatively thin section. From Meg. X.

5. Similar to No. 2 above but more worn out and broken working blade and butt-end; oxidized core partly flaked out giving a lenticular appearance in section. From Meg. XI.

6. Similar to number 1 above but working edge completely worn out resulting in a longitudinal rectangular section. From Meg. XII.

7. Similar to number 4 above with a less preserved core and oxidized edges. From Meg. X.

8. Similar to number 2 above but a little shorter; much worn-out and oxidized edges. From Meg. X.

9. Fragmentary arrow head of dove-tailed bottom; pointed-tang and lenticular section; tip and tail-ends broken. From Meg. II.

10. Worn-out triangular arrow head with broken tip and tang; lenticular section suggesting a sharp longitudinal rib in the centre. From Meg. II.

(Fig. 87)

11. Worn-out long lance-head with tip and edges broken; collered-socket at the bottom and conical tang; parallel edges and mildly lenticular section. From Meg. I, outside the cist.

12. Fragment of an iron object possibly a dagger; rusted and flaked out edges, and rendered thick by oxidation of the core, rectangular mid-section, the thickness increasing gradually towards the bottom. From Meg. II.

13 Long agricultural digging impliment of square section and pyramidal tang for handle; annular ring-coller at bottom separating it from the tang; worn-out, but still with partly unoxidized core. From Meg. XIV.

14. Long lance head with broken tip and pyramidal tang at the bottom; rectangular section, the longitudanal edges smoothly converging towards the tip. From Meg. II.

15. Worn-out long rectangular fragment possibly of a sword; core suffered oxidation resulting in flaking out of chips producing an uneven rectangular mid-section. From Meg. V.

16. Worn-out fragment of possibly a long spear-head; rectangular cross-section, the thickness gradually increasing towards the bottom. From Meg. VIII.

17. Spear-head with broken edges owing to flaking out by oxidation; of lenticular cross-section and a pyramidal tang. From Meg. X.

18. Spear-head similar to number 17 above, but more worn out towards the bottom and tang. From Meg. VIII.

19. Rectangular worn-out fragment possibly of a sword; of lenticular cross-section tending towards a rectangular form, towards the bottom. From Meg. V.

20. Worn-out long spear-head with broken edges and tang; longitudinal edges mildly curved; smoothly converging towards the tip; of lenticular transverse section and conical tang. From Meg. I.

21. Worn-out fragment somewhat similar to number 12; rectangular transverse section tending lenticular towards either of the ends. From Meg. II.

The following objects other than iron are illustrated ; (Fig. 88.)

1. Truncated conical pestle of sand stone with smooth convex top and bottom; curvature at top meets the handle in an oblique angle resulting in a sharp circular rib; faceted four-fold, above the bottom, producing a square transverse section with smoothly curved corners; From Meg. I outside the cist along the southern orthostat.

2. Bronze wiry-rod bent into a circular ring possibly served as an armlet; the ends overlapping over roughly a third of the circumference. Hammered into a circular shape, the diameter of section varies between 3 mm. to 5 mm. but the ends tend towards blunt points; From Meg. VII. Inside the cist and under the bone splinters.

3. A torus-shaped hand-made terracotta-ring with a large circular aperture; exterior convex surface irregular and mild rib; possibly a spindle whorl; From Meg. I.

4. Similar to number 3 above but a little smaller. From Meg. VIII.

5. Similar to the above two examples but smaller than them. From Meg. X.

6. Cylindrical bead of shell with serrated exterior and rounded edges. From Meg. XI, found under the human skull.

C. CLASSIFICATION

The megalithic cluster at site No. 63 principally comprises of two broad variants:

i) A profusion of stone-circle pit burials; and
ii) Stone circle cist type of a much limited frequency.

In fact a sub-division can also be attempted with respect to the orientation of the pit under the circle. The two cists in evidence are oriented east-west and among the pit burials 5 are east-west while 7 have their pits along north-south. Megalith No. III is an exception for these classifications. It's medium sized boulder with an attempt at dressing roughly confirm to an oval shape with the addition of a rectangular enclosure towards west. On grounds of stratigraphy it was observed to be of a late medieval origin. The irregular pit inside is not indicative of any funerary content. It is therefore doubtful whether it can be classified as a megalithic variant at all. Nevertheless its occurrence not as one among the megalithic cluster at site No. 63 in sector S IV, but in Sector S XII site No. 76, is an isolated example of its type. The irregular pit inside cannot be assigned any orientation and its meagre content in terms of a few scattered bone fragments of a bovine animal is not indicative of a sepulchural import of the site. At the same time, it cannot be excluded from a systematic analysis on the ground that its content is neglible. Huge megalithic stone circles were known to exist with no appreciable content at Brahmagiri Meg. III; Meg. IV of Sanur did not yield even a single fragment of a bone.[1] Even at Nagarjunakonda. Megalith IV yields only a few splinters of bones and no other associated finds, in the Megalithic cluster of site No. 63.

Sir Mortimer Wheeler presumed that Meg. III at Brahmagiri was robbed to explain the absence of the usual megalithic finds which sounds unrealistic. Barring the valuables the other items could not have interested a robber. At least the pottery and bones should have been left behind. An explanation for the absence of burial goods in an elaborate Megalithic tomb has to be formulated a little more plausibly than to envisage a robbery.

The appearance of a stone circle in a definitely known medieval context is too significant to be brushed aside. The tangible inference from meg. III, seems to be that the megalithic culture at Nagarjunakonda was no longer living and actively operating during the medieval periods but still lurks as a retreating memorary at least in a section of the population; the striking similarities of the Toda tribes' disposal customs[2] even to this day, prove its continuation into the modern periods also.

The standardisation of megalithic terminology attempted by late V. D. Krishnaswamy needs a revision to make it upto-date and to cater to the needs of the modern Megalithic excavations. In view of the accumulated South Indian megalithic data, even a chronological grading among the types may be possible now.

D. STRATIGRAPHY

The neolithic occupational layers, over sites, 45, 46 and 47 were observed to be thin and generally these are less than 30 cm. thick and often their thickness fell much shorter than this. It is but natural in view of the fact that these sites are distributed over an elevated area between 395 and 400 contours above M.S.L. Even the megalithic clusters were located

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[1] Ancient India, Vol. 12, p. 27.

[2] Guru Raja Rao B. K.; The Megalithic cultures of South India, Mysore, 1972, pp. 348—352.

with in the same contours and the space between them is interspersed by several chasms so that it became virtually impossible to establish even a schemetic linking up of the Neolithic strata with the megalithic clusters. It was observed that the pits in both the cases were dug into the calcareous disintegrated rock but the sealing layers in the case of neolithic settlements were thin and these were almost absent in the megalithic context. Because of the depression of level all around the neolithic settlements these habitational accumlations taper out of existence before any link up with the other cluster is attempted.

The neolithic graves exposed at site No. 63 are in a much lower level roughly about 370 M.S.L., near the river bank and are about 600 meters away from the actual water course. Even here the sealing accumalation was noticed to be thin, varying between 25 cms to 60 cms and part of the sealing layer suffered constant disturbance owing to the tilling activities of the villagers. So, no tangible inference can be made from purely stratigraphical considerations and for the same reasons stated above no schematic extension was attempted between sites 63 and 68.

So it was out of the question to propound a break in the sequence of Neolithic and megalithic cultures on the basis of stratigraphy. Nevertheless chronological separation is strickingly indicated by the pottery types and the iron impliments. If the copper filings discovered by Soundera Rajan at site No. 46 is any indication of a chalcolithic bearing in the upper neolithic levels, possibly its termination may be equated with the brass armlet unearthed in Meg. VII. Thus a definite chalcolithi chorizon is faintly noticed in between and in the determination of its period lies the key for the emergence of megalithic tradition at least in and around the valley of Nagarjunakonda.

Attempts at establishing a relative chronological link up between the excavated megaliths at site No. 63 again have been thwarted by castor seed cultivation in this area from a long time, which seriously disturbed the then accumalations of humus and layers sealing the pits dug into calcareous disintegrated rock. The cultivators collected a lot of rubble and dumped it over the stone-circles, to facilitate tilling of the area around the megaliths. These sub-angular granite stones forming a cairn within the stone circle, partly delved their way into the top soil with each rainy season. These megaliths thus served as a sort of a dumping ground for the cultivators and hence inferences based on top soils cannot be totally relied upon. Nevertheless, Megalith IX and Meg. VII were linked up and on the basis of layer 2 which appears in juxtaposition with the stones of Megalith IX extending under the stones of Meg. VII; it was inferred that Meg. VII was relatively a later addition to the cluster. But in view of the elevated position of the area over its surroundings, a few rainy seasons are sufficient to wash down the soils from a higher level to a lower level and hence the time lag may not be appreciable anyway.

On similar grounds it was felt that Meg. VI is later then Meg. VII, but the layer extending under the stones of VI is too thin being a little less than a centimeter and one can not be sure whether some of the stones of Meg. VII sank a bit into the soil over which these were made to stand, aided by their own weight and rains and the juxtapositioning of a too thin strip of earth with its stones was possibly not a later formation.

As the accumalation of sealing deposits are observed to be thin and that too with

disturbed features, it was felt safer not to base any inference solely on stratigraphical considerations alone. The stratigraphic link observed by Singh in case of Meg. IV with *Ikshvaku* memorial pillars is an indication of the scope for errors in judgement.

E. SKELETAL REMAINS :

Megalith I.

Cist Circle: Only one among the six skulls unearthed has been dealt here (Pl. C). The skull is smaller than the Neolithic ones. It is in a fairly good state of preservation. Part of the right *orbit* along with the cheek bone, *zygomatic* arch and tip of the *mastoid processes* are missing. The skull appears to be that of an adult male. The *glabella* and *superciliary arches* are not particularly prominent but big *mastoids*, blunt superior *orbital margins* and prominent muscular impressions at the *nuchal plans* are noticed. None of the cranial sutures is *ossified* but *spheno-basilaris* is united.

Seen from the above the skull is wide ovoid in shape, narrowed in front and expanded at the *parietals*. Frontal eminences are not very distinct. *Nasian* is not deep, frontal bone is slightly inclined and passes into moderately arched vertex. The skull is somewhat flattened behind, in the region of the *obelion* and *occipital squama*. The *cerebellar* part of the *occipital* bone is sloped upwards and backwards to the protruberance and superior curved lines. The frontal longitudinal arc exceeded the *occipital* arc. There is also evidence of slight subnasal *prognathism*.

Forehead is of medium breadth, the *orbital* outline (left) is somewhat squarish with rounded angles, and the left molar bone is broad and prominent. *Canine fossa* is well marked and the nasal *spine* of the superior *maxilla* is not prominent. The *occipital* outline is broad, house-shaped. Small *wormian* bones are present in the *lambdoidal* suture.

Palate is deep and the dental *arcade* is small U-shaped. Excepting two molars on either half of the *maxilla* and one right premolar, none of the teeth is present in the socket. *Mandibular fossae* are wide and moderately deep.

Megalith II.

Pit circle: The skeletal remains were found on a thin layer of ash on the pit-floor, in a rectangular pit at a depth of 1·96 m. below the present surface level. Large number of disintegrated human bones in a very bad state of preservation were placed in an extended position in north-south direction. A broken skull was found placed towards the north facing upwards. Along the *sagittal* plane the skull gave way into several fragments. *Naso-maxillary* portion of the skull was completely crushed. A portion of right half of the *mandible* with no teeth in their sockets was found a little below the skull fragments. Some fallen out teeth were scattered on the floor near about the *mandible*. Few pieces of ribs along with a skull fragment were found on one side of the northern half of the pit. Further below the *mandible* a fragment of right *scapula* and a distal end of the right *humerus* were seen. The right and left *femorae* were lying almost on their natural position. It appears that attempts were made to place those bones in their anatomical position. Fragments of skull,

acetabular region of the *pelvis*, fragments of *metacarpals*, fragments of *tibia*, fragments of *fibula* and fragments of *radius* were huddled together and placed in between the two *femorae*.

From the number of teeth and other long bones, it appears that the bones presumably belong to more than one individual. The muscular impressions and other characteristic features of the skull fragments, lower jaw and long bones suggest that they belonged to adult male individuals. Disarticulation of bones and partial or total absence of some bones, further suggest the burial to be of secondary nature.

Associated finds : A good number of pots were found placed on both the sides and at the southern end of the skeletal materials. Besides pots and offering stands, there were iron objects including javelin, tanged dagger-heads and few beads of bone or shell.

Measurement taken *in situ* :

Absolute length of left femur—466 mm.

Megalith IV.

Pit circle : The floor of the pit circle formed a rectangular grave with the major axis east-west. The north-east corner of the pit floor contained few pieces of fragmentary bones. The bone fragments were found at a depth of 2·37 m. from surface level.

Megalith V.

Pit circle : Grave pit was roughly rectangular in shape with the longer axis on north-south. On the pit floor the skeleton was laid restricted to an area of about 125 cms by 91·5 cms.

The burial contained disarticulated skeletal parts partly extended, north to south, on an ashy bed with the head placed towards the north. The bones were interred in the pit after excarnation.

The skull was found tilted on its right side resting on the *parietal* and right *occipital* region with its vertex pointing more or less to the west, while the *basilar* portion was facing east. The left *parietal* and part of the frontal bone had sunk within the skull cavity due to the weight of the filling above it.

The facial portion including *orbital* parts, nasal bones and *maxillary* parts were completely smashed. Some broken parts of the *mandible* were found by the side of the skull. Only sockets of the surviving right half of the horizontal *ramus* contained the first two molars. Of the other teeth, some were found fallen on the floor, nearby the broken *mandible*. The right *humerus* was lying in a slightly slanting position (north-west to south-west), the head of which was resting underneath the skull. Some of the long bones were found few centimetres away from the skull near about the *thoracic* region of the skeleton. These consisted of fragmentary pieces of the right *humerus*, *clavicle*, part of right *radius* (distal end missing), fragments of *ulna* and fragments of the left *radius* (with *caput*). All the above bones were arranged in a line extending west to east. Apart from these long bones, some fragmentary ribs and broken *phalanges* were also scattered there. The central region of the

right side of the skeleton was overlaid by big redware pottery. Just beneath the pottery was the right *femur*, lying slightly in an inclined position. The left *tibia* which was kept in a north-south direction with the head placed towards the north, was the other delimiting line enclosing the group of bones on its west. In between the right *femur* and left *tibia* there were fragments of *femur*, broken parts of the shaft of a right *tibia*, *phalanges* of the hand, fragments of the *vertebrae* and fragmentary parts of a *pelvis*, all jumbled together. The *pelvic* bones were totally disintegrated, only the shape was maintained to some extent by the core of earth.

From the robustness of the *femur* and other long bones, it appears that the skeleton belongs to an adult male. The skeletal materials are fragmentary in nature and crushed out of shape.

Associated finds: Of the grave-goods, pots were huddled mainly along the eastern and western outer fringes of the grave pit. Pottery includes black and red ware bowls, few dishes and ring stand in dull red ware of hour-glass shape. Besides pottery there were two iron objects.

Measurements taken *in situ:*

Length of the right *femur*	—507 mm (approx.)
Length of the left *femur*	+505 mm (approx.)
Length of the right *tibia*	—466 mm (approx.)
Maximum length of the left *clavicle*	—153 mm (approx.)

(1) Part of *radius* :

Diameter	—15 mm. *medio laterial*	at the *radial tuberosity*
	—14 mm. *antero-posterior*	
Circumference	—50 mm. at the *radial tuberosity*	
,,	—40 mm. below the *radial tuberosity*	
,,	—43 mm. the ridge of crest (below)	

(2) Part of a *tibia* (left)

	—26 mm. *(antero-posterior)*	
Diameter	—25 mm. *(mediolaterial)*	at the middle
Circumference	—82 mm.	

(3) Part of *humerus* (left):

Diameter	—23 mm. *(antero-posterior)*	at the middle
,,	—20 mm. *(medio-laterial)*	
Circumference	—70 mm.	

(4) Part of right *tibia* :

Diameter	—33 mm. *(antero-posterior)*	at the middle
,,	—24 mm. *(medio-laterial)*	
Circumference	—90 mm.	

Megalith VI.

PIT CIRCLE: The tomb consisted of a fairly deep pit, roughly rectangular in shape. It was oriented east-west. The skeletal remains lay almost on the floor-level of the pit, over a thick deposit of mixed up ash and earth, in an area of about 1·75 m. x ·61 m.

Skull fragments of three individuals and groups of disarticulated human bones were found lying in the central region of the pit extending from east to west. Skull fragments of each individual were placed one apart from the other but in a line, i.e. fragments of skull 1 at the eastern end, fragment of skull 2 at the middle and fragments of skull 3 at the western end of the skull remains. In between these skull fragments groups of human bones were huddled together in a jumbled fashion one above the another. The direction of the long bones were mostly east-west. The groups of bones were mostly east-west. The group of bones at the eastern half of the pit (i.e. the group of bones between skull fragments at the eastern end and at the middle) included fragments of right and left *humerus*, fragments of *femur*, some fallen teeth, fragments of *mandible*, right *ulna* fragments and fragmentary *radius*.

The group of bones on the western half (i.e. between skull 3 and skull fragments 2) comprised of: fragments of two *femorae*, fragments of two *humerii*, fragments of some long bones, fragmentary parts of a *mandible* and few teeth.

Besides human bones, some animal bones were also found scattered here and there in the same level as that of the human.

Associated finds: Red ware and black and red ware potteries of various shapes and sizes were found surrounding the pit. Besides pottery there were also few iron objects.

Megalith VII.

Cist circle: The megalith consisted of cist 1·72 m.x·46 m. at the top and nearly same size at the bottom. The cist chamber was of the shape of a rectangle, made of four orthostatic slabs. Its major axis oriented east-west, was 97° 30′ magnetic. The height of the northern and southern orthostats were 66·0 cm above the floor slab, and height of the orthostats on the eastern and western sides were 1·29 m. and 1·32 m. respectively.

There were two covering slabs, one on the eastern half and the other on the western half of the cist and the central portion remained open. There was no port hole.

The megalith did not contain any substantial skeletal remains, probably owing to the paucity of bones left after the excarnation of the bodies.

Within the cist the grave goods were disposed as follows:

(a) The filling inside the cist was of loose earth and occasionally with stones and potsherds.

(b) Immediately on the floor slab lay two *femurs*, one near the centre of the northern orthostat and the other near the centre of the southern orthostat. They were placed in east-west direction with their *proximal* ends facing east.

(c) On the floor slab also lay one *brass* armlet. It was placed just underneath the distal part of the *femur* on the southern side.

(d) About 7·6 cm. above the floor, covering an area of 43·2 cm. × 45·7 cm. towards the western half of the cist, some human bones were found.

Outside the cist: On the pit floor outside the cist (in the north-east corner) lay few human skull fragments along with fragmentary pieces of long bones. Few bits of animal bones were also noticed on the south-east corner of the pit floor.

No less than 17 pots were placed outside the cist. There was no pottery on the southern side. Two pots were also laid upon two covering slabs. Red ware pots were predominant. Besides these there were only few iron objects.

Measurement taken *in situ* : Length of the *femur* (on the southern side)—456 mm.

Megalith VIII.

PIT CIRCLE: Excavations revealed a central pit roughly rectangular on plan measuring 2·94m. × 1·24m. and a depth of 2·14 m. below surface. The major axis being east-west oriented. At a height of ·15 m. from the pit floor only few splinters of bones were recovered.

Associated finds: Pottery inside the pit, numbering over 14 and was predominated by red-ware pots. There was no pottery on the eastern side of the pit. The iron objects found inside were: wedge, nail, spear and small dagger like objects.

Megalith IX.

PIT CIRCLE: Grave pit was rectangular on plan measuring 2·74m. × 1·22m. at the floor and 2·14m. deep. This was found to contain only few pieces of animal bones in the south-western corner of the pit. No human bones were found.

Associated finds: Pottery —30
Iron objects— 7

Megalith X.

PIT CIRCLE: Central pit was roughly rectangular on plan with 2·44m. × 1·14m. on top and a depth of 1·83m. below surface. The pit contained disarticulated human bones placed in north-south direction with skull fragments towards the north. The skeleton occupied western half of the rectangular pit, covering an area of about 1·50 m. x .38 m. The skull fragments were badly crushed and scattered. It appeared from the skull fragments that they belonged to more than one individual and most probably two (four *mastoid process* could be detected from the skull fragments). *Mandible* too was broken into several pieces. In addition to skull fragments, there were fragmentary parts of the four *humerus*, broken *clavicles*, rib fragments, fragmentary parts of four *femurs*, fragments of *tibia* and some other long bone fragments. Of the above bones, *femurs* and *tibia* were placed huddled together on the southern half of the skeletal remains. The area, in between these bones and the skull fragments was less crowded and were occupied by rest of the bones already mentioned. The eastern side of the skeleton was practically guarded by two iron lances. They were placed one above the other in a cross-wise fashion.

Measurements of the bones *in situ* was not possible, owing to the extremely bad state of preservation of the bones. The end pieces of all the bones were destroyed.

Associated finds: Pottery inside the pit number 16, predominated by red-ware pots. Some of the pots were found huddled over the skeletal parts in the northern region.

Besides pottery, iron objects such as lances, wedge, and dagger were also found inside the pit.

Megalith XI.

PIT CIRCLE: Size of the oblong pit 2·49 m. × 1·14 m. It had fairly good number of disarticulated human bones, mostly long ones. They were placed in a north-south direction at different depths. The bones along the eastern half of the pit were at a higher level (about 10 cm.) than the bones of the western half. Most of the bones were practically restricted within an area of about 136 cms. × 84 cms. with two skulls placed apart. The presence of two skulls in the megalith indicates to be a case of double burial, comprising probably excarnated skeletal remains of two individuals.

One of the skulls, A (probably belong to skl. 1), isolated from the rest, lay in the north-western quadrant of the pit resting on its right lateral side with its vertex pointing west, and *norma basilaris* and *norma occipitalis* facing east and north respectively. The left lateral region of the skull, which was on the top, had broken into number of parts and ultimately sunk inwards, owing to pressure of filling. Particularly the left orbit and *maxillary* portion were found in crushed and distorted condition. There were only two *molars* in the socket in the right *maxilla*. The basilar part was disintegrated very much, only earthen core kept their impression.

A few centimetres away from the skull A (i.e. just below the pots on the central region of the western side of the pit), a group of bones were arranged extending from west to east. These consisted of fragments of left *femur*, fragments of right *tibia* and *fibula* (both placed beneath the left *femur* one above the other), fragments of right *femur*, broken part of left *tibia*, broken pieces of right *humerus* and the broken *mandible* (placed above the right *humerus* with its chin pointing north). The southern portion of the pit was less crowded, only fragmentary pieces of the *radius* and the *ulna* were there.

The other incomplete skull, B (probably belong to skl. 2) lay in south-eastern quadrant touching the eastern wall of the pit. It was completely smashed into numerous fragments and some parts even pulverized beyond recognition. Its lower jaw could not be traced. Some of the long bones possibly belong to the same skull (B) were placed along the eastern wall of the northern half of the pit. It comprised of fragments of a *tibia* and fragments of a *fibula*. A little down there were another group of bones. Starting with the *femur* the bones arranged in a row from east to west. They consisted of fragments of *femur*, broken part of *tibia* and fragments of *fibula*. The condition of the bones were extremely fragile and the end pieces were broken in almost every case.

From the general appearance of the skull and size of the long bones it appears the skeleton (i.e. skl. 1) on the western half of the pit belonged to an adult male and that on the eastern half (skl. 2) belonged to a female.

Associated finds: Of the 13 pots recovered from the grave, the majority lay along the western edge of the pit (at a higher level than the bones) and few were huddled just above the skull A. In addition to this pottery there was an iron celt lying in the centre of

the eastern side of the pit (on the bone level) and also one terracotta whorl bead found beneath the fragmentary skull (skull B).

Measurements taken *in situ*: Length of the left *femur* (Skl. 1)—469 mm.
Length of right *humerus* (Skl. 1)—332 mm.

Megalith XII.

Pit circle: Internal diameter of the pit circle 5·64 m. Depth of skeletal remains in the filling:

(1) Articulated animal (small) of the upper level—1·98 m. below surface.
(2) Articulated animal (*bovine*) —2·22m. below surface.
(3) Human skeletal remains in the pit floor —2·52 m. below surface.

Grave pit was roughly rectangular, measuring 2·52 m. by 1·09 m. at the top, with the major axis pointing north-south.

Animal Skeleton (Calf SKL 1): It was an articulated skeleton though disintegrated to a great extent. The skeleton lay in the northern part of the rectangular pit in the east-west direction with the head towards the west (skull cap was abasent). Only few fragments of lower jaw and some teeth were embedded in the earth. The skeleton was found resting on its right side with its major axis at right angles to the major axis of the bovine animal at a lower level (·31 m. below). The skeleton was disintegrated to such an extent that excepting traces of bones in their natural position, not a single intact bone was found. Forelimbs were flexed. Below the skeleton there was a stone-bed.

Measurements of the skeleton *in situ*:

Total length of the skeleton (from *anterior* end of the skull to the distal end of the hip joint)	—102 cm.
Length of the *scapula* (left)	— 86 mm.
Breadth of the *scapula* (left)	— 90 mm. app.
Length of the *femur* (left)	—230 mm. ,,
Length of the *tibia* (left)	—195 mm. ,,
Length of the *humerus* (left)	—172 mm. ,,
Length of the *humerus* (right)	—162 mm. ,,

Animal Skeleton (Bovine SKL 2): The articulated skeleton was only a foot below the upper small animal. It was oriented from north to south with the head to the north-east corner and face turned towards the west. Vertebral column was along the eastern side of the pit.

The skull was broken and its *collote* missing. The presence of definite cut marks on the teeth along the *alveolar* margin of the *maxilla* suggests that the skull cap had probably been sawed longitudinally across the teeth of the upper jaw with a sharp weapon. The *symphysical* portion of the lower jaw is found broken and crumbled down. Few incisors, probably of the lower jaw, were also found embedded in the same region. The ribs and

vertebrae, though in position, were in a fragmentary condition and even incomplete. The *scauplas* and *pelvis* were very fragile and fragmentary. Both the *femorae* dislodging from their *acetabular* cavities lay few centimetres away from the *pelvis*. Similarly the *humerii* were dislodged from the *glenoid fossae*. The left *radius* and *ulna* were not in articulation and were shattered into many pieces. The left *tibia*, too, was not in its position and was lying slightly displaced from the *condyle* of the *femur*. Other limb bones including right *tibia* and *cannon* bones were fully articulated.

Tailbones and *phalanges* of both *manus* and *pes* were available in their respective positions, though some of the *phalanges* were missing.

Measurements *in situ* of the bovine skeleton:

Length of the skeleton	—1370 mm.
Length of the right *metatarsal cannon* bone	— 270 mm.
Length of the left *metatarsal cannon* bone	— 275 mm.
Length of the left *femur*	— 405 mm.
Length of the left *tibia*	— 398 mm.
Length of the left *humerus*	— 300 mm.
Length of the *metacarpal cannon* bone (right)	— 246 mm.
Length of the *metacarpal cannon* bone (left)	— 244 mm.
Length of the *scapula* (left)	— 368 mm.

Diameters:

Medio-lateral diameter of the left *metatarsal cannon* bone—

at the *prosimal* end—38 mm.
at the middle end —31 mm.

Human Remains: A small group of disarticulated human bones were found placed in the central space upon a thick 10·2 cm. ashy bed of the pit, though partly pushed towards the north.

The direction of the bone was north-south and they were restricted to a very small area of about 1161·3 square cm. The group consists of broken parts of *femur*, fragments of *tibia proximal* part of *ulna* fragments of two *humerii*, fragments of *radius*, fragmentary pieces of lower jaw and some unidentified fragments of long bones. Besides these some teeth were also found along with the bones. As the end pieces of all the bones were either broken or decayed, measurements of the bones *in situ* could not be taken. Skeletal remains belonged to a child (?).

Associated finds: Pottery and iron implements.

Megalith XIII.

Pit circle: The tomb consisted of a fairly deep pit, roughly rectangular in shape; It was oriented north-south.

Groups of disarticulated human bones were found huddled together in the centre of the northern half of the rectangular pit. Skeletal remains lay on the floor level of the pit upon a layer of ash and loose earth of 15 cm. thick, covering an area of about 82 cm. by 20 cm. The long bones were placed in a north-south direction with some fragmentary skull bones to the north. Besides skull fragments, group of long bones consisted of fragmentary parts of *femora*, broken *tibia*, fragments of *ulna*, broken pieces of *clavicle*, fragmentary *pelvic* bones, pieces of broken *metacarpals* and *phalanges*, and few bits of fragmentary ribs.

Associated finds: Pottery numbering 17 were placed around the pit but slightly at a higher level than the bones. Besides pottery, there was only one small iron object.

Measurements taken *in situ*: Length of the left ulna—298 mm.

Megalith XIV.

PIT CIRCLE: The pit contained an extended and articulated human skeleton, oriented north to south (358° 30' magnetic) with the head placed towards the north facing east. The whole skeleton lay on its left lateral side and compressed from side to side due to the pressure of filling above it. Being thus compressed the bones became deformed and were lying very close to each other.

The skull was badly warped and distorted posthumously. It was also compressed laterally resulting in complete dislodgement—of bones from the sutures and bulging out at the vertex. The facial portion including *orbits*, nasal bones and *maxillary* part was crushed out of shape. Some of the teeth of the *maxilla* could be found in their sockets. Third *molars* of the *maxilla* probably had not been erupted.

Mandible was in its position but in a fragmentary nature; some of its teeth were found lying beside it, embedded in the core of earth. All the *molars* of the *mandible* were present.

Both right and left *scapula*, as well as the *clavicle* were very much disintegrated and were represented by few fragments only. *Humerii* were lying very close and parallel to each other with their head portions completely decayed. *Radius* and *ulna* of both right and left sides, though articulated, were in a fragmentary condition. It appeared that both the hands met at the *pelvic* region. *Pelvic* bones were also crushed out of shape and its major portion was decomposed.

The head of the left *femur* was found articulated in the *acetabular* cavity. The right *femur* though not articulated, was in anatomic position and ran parallel to left one. The right *tibia* and *fibula* lay upon the left ones but slightly in a slanting position, with their *proximal* ends pointing north-west.

Few *tarsals*, *matatarsals* and *phalanges* were seen round about the lower ends of the *tibiae*, but they were almost crushed and incomplete.

The size and ill marked muscular impressions, smoothness as well as other features of the bones, indicates it to be an adult female.

Some animal bones were also found nearly 10 cms. higher than the human skeleton level and seemed to be deposited along with the pottery after the skeleton was covered with earth.

Associated finds:

Pottery—Total number of pottery—12.
Iron objects—Iron object included lance and wedge.

Besides iron objects and pottery, two spiral ear-rings made of gold wire, 35 gold beads and 18 silver spacing beads were also found. Of the two ear rings, one was found sticking near the left *auricular* region of the skull and the other ear-ring was found fallen off just below the right *mastoid process*, meaning thereby that the body was buried putting with the ear ornaments on.

The gold and silver beads were found embedded in the earth around the *cervical* region of the skeleton.

Measurements taken *in situ* :

Length of the skeleton —1584 mm.
Length of the left *femur* — 440 mm.
Length of right *tibia* — 373 mm.
Length of left *tibia* — 377 mm.

Megalith XV.

PIT CIRCLE: Megalith contained more or less rectangular pit. Skeletons were found at a depth of 1·88 m. below the present surface level.

In the central portion of the pit floor upon 15 cm. thick ash deposit, an articulated human skeleton was laid oriented east to west (106° 30′ magnetic) with the head placed to the east facing towards the south. The skeleton lay on its left side with its arms folded over its breast, while the lower limbs were placed in a loosely flexed posture.

The skull lay on its right lateral side. Excepting the left *parietal*, parts of the frontal and *occipital* bones, rest of the bones were either completely smashed or decayed. Only some of its components were found sticking inside the skull cavity intermixed with the earth. Fragments of *mandible* were found in natural position lying beside it.

Soft bones like *scapula* and *pelvis* were completely decayed out, only remnants in bits were present in position. The ribs and *vertebrae* were very much fragmentary and incomplete. The right *clavicle* was displaced and found lying over the ribs. Few *metacarpals* and *phalanges* were found mixed up near about the distal ends of *radius* and *ulna*. The right *femur*, right *tibia* and *fibula* lay parallel with their corresponding *femur*, *tibia* and *fibula*.

Associated finds: Eleven pots and an iron object.

Measurements taken *in situ*:

Length of the skeleton —1580 mm.
Length of the left *femur* — 435 mm.
Length of the right *fibula* — 328 mm.

Length of the *clavicle* — 127 mm.
Length of the right *humerus* — 282 mm.

F. POTTERY

The pottery of this period consists mainly of two wares, i.e., Red and Black-and-red, though all Black ware is also represented by a single specimen of lid type. The fabric of this pottery on the whole, is superior to that of the preceding period and is entirely wheel made, possibly on slow wheel, as the striation marks are not very sharp, with the exception of the body of two huge redware urns, which are handmade.

The clay of Black and red ware has been well levigated and does not usually have any sand particles, etc. in the paste. It ranges in fabric from medium to fine and has been fired under reducing conditions in the kiln possibly by 'inverted firing' process.[1] This ware usually has a thin section. Most of the vessels have been treated with a glossy slip on both sides and quite a few of them are salt-glazed. It cannot resist water and easily collapses, if soaked for longer duration. Even the shiny slip disappears, if enough care is not taken while washing. There are no decorations, whatsoever, on any of the Black-and-Red ware pots, but a few have graffiti marks on the exterior.

The most common types in Black-and-Red ware available from the cists and pit circles are medium to large sized deep bowls with bulging body, shallow dishes with carinated waist, small to medium sized straight or concave sided bowls with carination above the round base and tulip shaped lid-cum-dishes.

The clay of the plain redware is not so fine as that of the above and ranges from coarse to medium in fabric, although some percentage belongs to fine fabric as well. A little of grit and sand particles have been mixed in the paste. Most of the redware pots have been uniformly fired with the exception of about half a dozen, showing indifferent firing. This ware is water resistant unlike Black-and-Red. Majority of the vessels carry a bright red slip and a few have thin terracotta wash. One of the two huge urns (8a) has been decorated with a finger-tip pattern around the body and MR 5a has incised zigzags.

The types available in redware are medium to large-sized jars, elongated stands, cooking vesseles, lota types and huge jars in the order of the frequency of this occurrence.

There is only one lid type in fragments, of all black ware from Meg. VII (a cist). It is of medium fabric and carries a glossy slip on both sides.

Out of the fifteen excavated megaliths of Nagarjunakonda, only two are cist types and the remaining are pit circles but there are slight changes in the pottery of both the types of megaliths. The features worth mentioning are (1) that there is a majority of Black-and-Red ware vessels in cists and that of redware in pit-circles, (2) Straight/concave sided medium sized Black-and-Red ware bowls are common in the cists but absent in the pit circles, with the exception of the one 4b from Meg. VIII, (3) elongated stands of red-ware are available only from the pit-circles. A single all black ware lid with solid ring-handled

[1] Herr Adam Winters Kastel Mainz, on the basis of his research on ancient pottery, showed me that the firing process need not necessarily be an inverted one, in case of prehistoric pottery.

top is available from Meg. VII(cist). It is really strange to note that only one such specimen is available from all the megaliths. "All black ware is conspicuous by its absence...."in the burial pottery of Maski as well.[1]

Black-and-Red-ware is roughly a quarter of the total assemblage. The remaining ones belong to redware. It is worth mentioning that medium-sized red-ware pots, which might have been used either for storing water or other purposes, are more than 50%. Does the abundance of such pots signify anything? Next to these pots are the stands in order of frequency. How is it that they are available only in pit-circles and not in the cists?

Their absence seems to be a matter of convenience in this context. Since all the grave furniture has been found lying outside the stone cists, the megalithic builders seem to have taken advantage of the stone slabs of the cists on one side and the hard rock-cut surface on the other. In this narrow strip the pots could rest easily without much of movement. Such an advantage is not available in the simple pit-circles, where the pots had been kept on the stands all around the skeletal remains. The concentration of the pottery in the cists is only on one side, where there is sufficient space between the cist slabs and the rock-cut surface. Here the pots have been kept one above the other, whereas such an evidence is not available from the pits.

All the types found in Nagarjunakonda megaliths are analogous to most of those found in Brahmagiri, Sanur, Kunnattur, Porkalam, Maski, Piklihal, Yelleswaram, Patancheru, Nurgampalle, Hasmatpet and Lam, etc.

Although the total number of pots recovered from the megaliths is 215, the types represented are comparatively limited. Unfortunately no megalithic habitation site could be found in the Valley. But recent excavations by the State Archaeology, Hyderabad have revealed some of the types along with typical megalithic pottery in Black-and-Red-ware from megaliths of Kistapur, Lohimancharuvu and Veeraboinakunta near Yelleswaram on the other bank of river Krishna. They are comparable with the pottery types of early historic period of Nagarjunakonda. Such a similarity might be helpful in dating the megaliths of Yelleswaram area and their association with those of Nagarjunakonda. All black ware low ring stands are conspicuous by their absence here, whereas they are in a large number at Yelleswaram. Similarly conical lids of black ware, a common type in other megalithic sites, are significantly absent at Nagarjunakonda. Lid-cum-bowls and miniature pots of red-ware are in abundance there but missing here. It is really surprising that not a single vessel of megalithic Black-and-Red ware of Nagarjunakonda has any analogous types in the early historical black and red-ware pottery, although 1 and 2 with variants, have only superfluous affinity with a few in red-ware, occuring in the early levels of historic times here. Unfortunately no megalithic habitation could be encountered in Yelleswaram as well.

Some of the representative types from cists and pit circles are described below :—

Fig. 89.

Type 1. A dish of Black-and-Red ware with a featureless rim, almost vertical sides, bluntly carinated waist to a sagger base. Of medium to fine fabric, treated with a glossy slip on either side. From

[1] *Ancient India* No. 13—page 50.

outside the cist in Meg. I. Rough analogies come from Brahmagiri[1], Porkalam[2], Maski[3], Sanur[4] and Yelleswaram[5].

Type 1a. similar to the arch type, but smaller and has an internally thickened rim, carries a slip. From Meg. XIII.

Type *1b.* is shallower and has slightly inturned rim. From Meg. VIII.

Type 2. A Shallow bowl type with a nail-headed rim. Of fine fabric, with a shiny appearance. From Meg. XII.

Type 2a. Similar to the arch type and externally thickened rim. From Meg. I. Rough analogy comes from Brahmagiri cist[6]. This type occurs in Red-ware as well.

Type 3. A bowl type with out-curved and internally thickened rim (weakly) carinated shoulder and rounded base. Of fine fabric, smoothened and treated with a shiny slip on both the sides. From outside the cist in Meg. I.

Type 3a. Akin to the arch type but has a rounded profile and better finish. From outside the cist, Meg. I.

Type 3b. Same as above but deeper and of medium fabric with slipped exterior and interior. From Meg. I.

Type 3c. Slightly wider than the arch type and has a sharply carinated shoulder, of medium fabric with occasional particles of sand in the paste. From outside the cist in Meg. I.

Type 4. A carinated bowl type with externally thickened and internally grooved rim, mildly ledged and carinated waist and deep rounded base, of medium fabric. From Meg. IX.

Type 4a. Smaller and thinner than above with an everted featureless rim. From Meg. VIII.

Type 4b. Akin to above. From Meg. XIII.

Type 4c. Similar to above. Of medium fabric, carries a slip on both sides. From Meg. III.

Type 4d. A thickened rim and sharply carinated waist. Rough analogies came from Brahmagiri[7], Maski[8] and Sanur[9].

Type 5. A bowl type of Black-and-Red ware of medium fabric with a slightly out-turned featureless rim, widening shoulder and round base. From Meg. I.

Type 5a. Smaller and deeper and has an externally cut rim, of medium fabric and thin section, it carries a slip on either side. From Meg. XIII. Analogous types are available from Brahmagiri[10], Maski[11], Sanur[12], Yelleswaram[13] and Pikfihal[14].

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[1] *Ancient India*, No. 4, p. 211, fig. 10, C 13 and p. 13.
[2] *Ibid, No. 8*, p. 10 fig. 2, 7.
[3] *Ibid*, No. 13, p. 66, fig. 22, 9c.
[4] *Ibid*, No. 15, p. 21, fig. 2 (2).
[5] *Yelleswaram Excavations*—Fig. 1-2a.
[6] *Ancient India*, Vol. 4, p. 211, fig. 10 C. 18.
[7] *Op. cit.*, p. 219 fig. 15, F. 19 and 9 in fig. 17.
[8] *Op. cit.*, p. 52, fig. 14, B (1)2.
[9] *Op. cit.*, p. 21, fig. 2(6).
[10] *Ancient India* Vol. 4, p.211 and C 18, p. 10 and T. 105.
[11] *Ibid*, Vol. 13, p. 52, fig. 14, B(10)3.
[12] *Ibid*, Vol. 15, p. 26, fig. 5 (34).
[13] Information from Dr. Srinivasachari, Director, State Archaeology, Hyderabad (Reserve collection).
[14] Site 7, (8) (in Hyderabad State Museum).

Type 6. A Black-and-Red Ware diminutive sized bowl with a featureless rim, almost straight sides, carinated to a rounded base. Of fine fabric, slipped on both sides. From south-western corner of Meg. I. Rough analogies come from Chandravalli[1], Brahmagiri[2], Sanur[3], Mask[4], and Veeraboinakunta(Yelleswaram)[5].

Type 6a. Fragmentary having concave sides sharply carinated to a deep rounded base. Of coarse to medium fabric, from Meg. XIII.

Type 6b. A bigger and coarser variety than the arch type, with concave sides and sharp carination From Meg. VII.

Type 6c. A diminutive type, of medium to coarse fabric and thick section; fragmentary and grooved on the exterior. From Meg. VIII.

Type 7. A rare and unique Black-and-Red Ware bowl with slightly out-curved rim, grooved and ribbed body, sharply carinated waist and rounded base, of fine fabric, smoothened and carries a slip on the exterior and interior upto the neck. From south-eastern corner of Meg. I. Porkalam[6] is the only site, which seems to have a rough analogous bowl of this type.

Fig. 90

Type 8. A medium sized vase of Black-and-Red ware with out-turned, externally thickened rim, mildly concave short neck, bulging profile and rounded base, medium to fine fabric, treated with a fine glossy slip on the exterior and interior upto the neck, carries graffiti marks on the shoulder. From Meg. IX. Analogues come from Brahmagiri[7], Maski[8], Sanur[9], and Kistapur (Yelleswaram)[10].

Type 8a. Akin to above but without graffiti. From Meg. IX.

Type 8b. Externally thickened and cut rim. Of fine fabric, carries a glossy slip and graffiti marks on the shoulder and in the lower half. From Meg. VIII akin to 2b.

Type 9. A typical tulip shaped lid-cum-bowl common to all Megalithic sites, has an externally thickened and drooping rim. Of coarse to medium fabric, carries a slip on both sides. Rough analogues come from Brahmagiri[11], Maski[12]. From Meg. XIV.

Type 9a. Akin to above but with a thicker rim, and section and coarse to medium fabric, slipped on either side. From Meg. XII.

Type 10. A typical lid of all-black-ware with a solid ring handle at the top for grip, steep profile and vertical featureless rim base, of medium to fine fabric, treated with a glossy black slip on both sides. From Meg. VII (cist). Analogues come from Sanur[13], Brahmagiri[14] and Arikamedu[15]. It served as a lid over 6b, as found *in situ*.

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[1] *Ibid*, Vol. 4, p. 275, fig. 43, M 3.
[2] *Op. cit.*, p. 211, fig. 10C, 10B and p. 9.
[3] *Op. cit.*, p. 35, fig. 4 (41).
[4] *Op. cit.*, p. 66, fig. 22, 2.
[5] Information from Sri A. Waheed Khan, Director, State Archaeology, Hyderabad.
[6] *Op. cit.* fig. 2, 5.
[7] *Op. cit.*, p. 223, fig. 17.2.
[8] *Op. cit.*, p. 56, fig. 17, B(ii)7.
[9] *Op. cit.*, p. 25, fig. 4 (45).
[10] Collection in Hyderabad Archaeological office.
[11] *Op. cit.*, p. 218, fig. 14, p. 11.
[12] *Op. cit.*, p. 58, fig. 18. B. (iii) 5.
[13] Sanur 50 and 52 Ancient. India. Vol. 15, p. 28, fig. 74.
[14] Ancient India, Vol. 4, p. 217, fig. 13—p. 2.
[15] Ancient India, Vol. 4, p. 274, para 2.

Fig. 91

Type 11. A red-ware basin with externally vertical cut rim, short concave neck, multigrooved widening shoulder and rounded base. Of medium to fine fabric, treated with a bright red slip on the exterior and interior upto the neck., evenly fired. Rough analogues come from Brahmagiri[1] and Sanur[2].

Type 11a. Differs from the arch type in size and having externally thickened rim and bluntly carinated waist. From Meg. VII. A number of variants of this type are available in megalithic Black-and-Red ware.

Type 12. A medium to large sized pot-bellied vase of red-ware with an out-turned featureless rim, concave neck having a rib around, and round base. Of medium to fine fabric, burnt black in section and treated with a shiny red slip on the exterior and interior upto the neck and carries a graffiti mark. From Meg. XIV. Analogues come from Lohimancharuvu (Yelleswaram)[3].

Type 12a. Deeper than the arch type with a splayed out and externally grooved rim (akin to 6) and weak grooves on its expanding shoulder. Of medium fabric, thinner in section and carries a light red slip on the exterior and interior upto the rim, bears a graffiti mark on its shoulder. From Meg. III.

Type 12b. A small and thick rim. Of medium to coarse fabric, burnt grey in section with slip. From Meg. V.

Type 12c. Akin to above, of medium fabric, with a thin red slip, and graffiti marks on the shoulder. From Meg. III.

Type 13. Splayed out rim, bulging body and round base, indifferently fired with a thin slip. From Meg. X.

Type 13a. A red-ware small to medium sized lota type indifferently fired with slightly out-turned, and thickened rim, and a rounded base, of coarse to medium fabric, gritty core and section burnt grey devoid of any slip, carries a thin terracotta wash. From Meg. IX. Rough analogy comes from Sanur[4].

Type 14. A red-ware vase slightly bigger than above with externally obliquely cut rim, short neck, globular body and rounded base. Of coarse to medium fabric, treated with a thin brown slip on the exterior and interior upto the neck and a soot-stained appearance (perhaps due to its use as a cooking vessel). From south-west corner of Meg. I. Analogues come from Brahmagiri[5] and Maski[6].

Type 14a. Similar to the arch but differs in having slightly out-turned featureless rim. From Meg. I.

Fig. 92

Type 15. A jar of red ware with externally thickened and cut rim, vertical neck, bulging profile and rounded base, of medium to coarse fabric, burnt black core and carries a red slip on the exterior and interior upto the neck. From outside the cist in Meg. I. Similar types occur in the pit circles also. Analogues come from Brahmagiri[7], Maski[8], Sanganakallu[9], Sanur[10] and Yelleswaram.

Type. 15a. Slightly bigger with a bright red slip, carries incised zigzag decoration in between two incised bands on the shoulder. From Meg. X.

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[1] *Op. cit.*, p. 218, fig. 14, F 17 & in fig. 17—3.

[2] *Op. cit.*, p. 25, fig. 4, 46.

[3] From Meg. I (cist) in Hyderabad Archaeological office collection.

[4] *Op. cit.*, p. 26, fig. 5—60.

[5] *Op. cit.*, p. 212, fig. 11, C. 20.

[6] *Op. cit.*, p. 53. fig. 15, B(i) 10.

[7] *Op. cit.*, p. 219, fig. 13, p. 18.

[8] *Op. cit.*, p. 61, fig. 20 B (iv) 2.

[9] B. Subbarao, *Stone Age Culture of Bellary*, pl. V. Type IX.

[10] *Op. cit.*, p. 29, fig. 7—82.

Type 15b. Differs from the arch type in having a horizontally splayed out rim and grooves below the neck, of coarse to medium fabric, devoid of any slip with traces of lime coating on the exterior. The striation marks inside at the rim are seen clearly. From Meg. X.

Type 15c. A beaked rim, globular body and grooved shoulder. From outside the cist, Meg. I.

Type 15d. A thickened and internally grooved rim, multigrooved exterior below the neck with a bulging profile. From outside the cist in Meg. I.

Fig. 93.

Type 15e. The biggest of all, uniformly fired, carries a light red slip; From Meg. VII.

Fig. 94.

Type 16. A redware jar with horizontally splayed out and grooved rim, almost vertical neck, multigrooved shoulder and bulging profile and a rounded base. Of medium to fine fabric, treated with a bright red slip on the exterior and interior upto the neck. From the north-east corner of the pit and outside the cist in Meg. I. One analogy comes from Maski[1].

Type 16a. A splayed out and sharply grooved rim, slipped externally upto shoulder and internally upto neck. From Meg. I.

Type 16b. Slightly smaller than the arch type and has a long rim and high vertical neck. The black patches on the body show uneven firing. From Meg. I.

Fig. 95.

Type 17. A fragmentary stand of red ware with flaring internally collared rim, elongated concave sides and flaring externally collared rim base, of coarse to medium fabric, treated with a light red slip on the exterior and interior upto the rim. From Meg. II. Rough analogues come from Sanur[2], Porkalam[3], Yelleswaram and Ningampalli, Lohimancharuvu, Kistapur and Maski. A number of such stands have come from pit circles.

Type 17a. A variant complete with a drooping rim, carries a glossy slip. From Meg. V.

Type 17b. The longest sample having grooved rim and prominently collared rim base, of fine fabric, and a red slip. From Meg. X.

Type 17c. A wider stand with a number of grooves on the exterior (lower half). From Meg. X.

Type 17d. Unusual in appearance because of its relatively straignt sides, drooping rim and flat base. From Meg. XII.

Type 17e. A short stand with a slip. From Meg. V.

Fig. 96.

Type 18. A huge redware urn type with flaring rim, handmade elliptical body tapering to a thick disc base (Plate CIA). Of coarse fabric, burnt black in section, a light red slip in the upper half and interior upto the rim, indifferently fired with a black patch on the exterior, carrying the impressions of grass outside. The base has a mat design (Plate CIB). From Meg. X. Rough analogies come from Sanur[4] and Yelleswaram, etc.

Type 18a. Fragmentary and cruder than above with a thickened rim, bears the feature of finger tip pattern decoration in double rows on the shoulder and loop on the lower, uniformly fired with a light red slip on the upperhalf. From Meg. VIII.

Out of a total assemblage of 215 pots, only eleven have graffiti marks.[5] One each

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[1] *Op. cit.*, p. 61, fig. 20 B (iv) 4.

[2] *Op. cit.*, p. 23, fig. 3 (14 to 17).

[3] From all these sites the stands are either low or in black slipped ware.

[4] *Op. cit.*, p. 29, fig. 7—81.

[5] See also the Annual Reports of Archaeological Department of H.E.H. Nizam's Dominions 1915-16, & 1916-17.

from the cists, i.e., Meg. I and VII, three from Meg. IX and remaining six from other Megaliths.

They are all post firing incisions and do not show much variety. The common form is that of U, straight or everted with some additional scarlings mostly on one side. Very few of these marks have got their analogies elsewhere. A twisted mark with a double knot on one of the pots from Meg. VII is unique. The variants U and V were observed at Sanur and Maski.

Only five of the eleven marks are illustrated here:

Fig. 90.

1. Two groups of marks, three on the shoulder and one on the lower half of Megalithic Black-and-Red 8b. The top row gives an impression of some writing. Y standing on a horizontal line, connected with an elongated U, having a forked right arm, separated by an independent U form, next to which are three lines, middle one making an inverted and elongated straight Us respectively. The lower half is also an angular U form with an additional curved line and a cross on the horizontally stretched left arm.

2. Another complicated group of marks, which also look like '*Trisula*', as in I, with forked and curved arms is one case and two additional lines added to the left of the other. It looks like an inverted angular U also, if the L form connected with the *Trisula* form is considered as one. Also on Black and Red ware (8). It appears to be variation of Yazdani's 177[1].

Fig. 91.

3. A pair of Us connected by inverted L. (12).

4. Almost similar to above but making another U on the left connecting a pair of Us, with hook Ls. (12 a).

5. A pair of inverted Us connected by a horizontal line. The one on the right seems to be incomplete and looks like a variation of Yazdani's 63[2] (12 *c*).

6. A twisted double knot mark and occurs on a red ware sherd from Meg. VIII (Not illustrated).

G. ORIGIN :

Megalithic tombs were under the intensive study of Archaeologists from the later half of 19th century.[3] Yet the problem eluded a firm grip and most of the inferences based

[1] *Annual Report of Archaeological Department*, 1916-17, p. 6, fig. 1.

[2] *Ibid.*

[3] However the interest in the study of such monuments could be seen hinted in the west in the publication of J. Ferguson 'Rude Stone monuments in all countries, their age and uses', 1872. An earlier reference to the distinctive nature of Indian megaliths was denoted by Vanstavern in his 'Note on the Antiquities found in the parts of the upper Godavari' Indian Antiquary, Vol. IV, pp. 305-6, 1875. Later publications like Jagor's Excavation Report on the stone burial site of Adichennalur in 1876, and Rea's 'Catalogue of Prehistoric Antiquities of Adichennalur and Perumbiar' in 1915. Also deserving mention are the contributions of J.W. Breek's 'An account of the Primitive Tribes and Monuments of the Neelagiri's London, 1873', pp. 72—110, and Foote's 'Catalogue of prehistoric antiquities', Madras, 1901.

on the excavated data tended to be hypothetical and the theories with regard to their origin on chronology did not pass beyond the realms of presumption. Their dense distribution in the Deccan and the South, strongly speaks in favour of a Dravidian origin for these burials, which can not be easily ruled out on considerations which may appear contradicting such a probability superficially. Their sporadic occurences in the North have to be viewed perhaps as scattering spurs of a basically Dravidian trait of the South, particularly because the North and the South were never mutually exclusive even during the pre-Vedic times.

Nevertheless it may be freely conceded that the Geography helped considerably the natural instincts of the primitive communities to isolate themselves from the influences of the others. But such efforts are bound to encounter only a partial success and no wonder we discover difused characteristics of the one culture in the other in an analysis of ethnic features in relation to the Geographical set up. In other words it is impossible for us to discover a period or epoch of time when the North was completely and purely Aryan in character and the South totally and purely Dravidian, ignoring for argument's sake the numerous other ethnic influences in the Indian heterogeneous composition of people.

In this context Gordon's[1] view that megalithic people entered India from the west by a direct maritime route is unconvincing. The maritime contacts were bound to be few and far between in such remote times and adventurous expeditions if any by a few, fail to bring about any drastic change in the already existing set up in a country like India. This seems to be an all time truth as far as India is concerned and curiously even after extensive contacts with the various cultures of western Europe from the 16th century onwards the core of Indian civilization did not undergo any metamorphosis.

A ceremonial burial custom appears to be purely of an Indian origin or more precisely of a Dravidian origin. But it is not unlikely for them to have adopted a few peripheral patterns which appealed to their imagination and were likely to go along with their traditions harmoniously. The west Asian contacts either maritime or otherwise may have influenced only those who were traditionally accustomed to one sort of ceremonial burial or other. Thus, the much discussed porthole was in all probability a western innovation which appealed to the imagination of a section of the megalithic builders, who readily adopted and made it a part of their tradition. Any surmise as to whether the custom reached the south along the North-west land route or by a maritime contact is still open to doubt. The discovery of Fairservice of a portholed cist in the neighbourhood of Karachi by itself though probable, is still too weak in support of a land route theory at this stage. Further connecting links have to be brought to light for or against such a proposition.

The traditional anecdotes collected and reported recently by Guru Raja Rao[2] in his thesis are indicative of the fact that these burials were puzzling features of interest for the people of all historic periods, who tried to interpret them in their own way, with

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[1] Gordon, D. H. 'The Early use of Metals in India and Pakistan; Journal of Royal Asiatic Society, London, 1950, Vol. 80, pp. 65—67.

[2] *Op. cit.*, pp. 319—321.

an admixture of mysticism to cater to the imagination of lay people who seem to like it that way from times immemorial.

It is not possible to verify whether the Dravidians migrated from the North or through a maritime route directly from the Medeterranean regions as propounded by Haimandorf from the megalithic data. But Haimendorf's reasoning is too hollow to be acceptable. Dravidian cultural traditions were sufficienly strong to be easily superseded by Aryan customs and the continuance of cross-cousin marriages in the South does not prove or disprove their migration from the North. On the other hand, one can argue that because some of the Aryan impositions were repugnant to their customs, Dravidians *en masse* migrated from the North to the South.

But viewing the problem from another angle, the caste structure of India appears to have originated only to prevent the intermingling of races. The Brahmin and Kshatriya were not originally segregated from each other and the laws of Manu speak of their identity with one another[1] while setting the other two castes on an altogether different footing[2]. The Vaisyas were the ruling class in the Dravidian structure of society, while the Sudras appear to be workers. The word *Varna* strongly speaks in favour of a different racial origin. To keep their race pure and unpolluted by the Dravidians in a heterogeneous social structure, the caste system, was introduced by the Aryans. Initially they had no necessity for a fifth caste at all[3]. People of Aryan blood were comprising the first two castes with a ruling grip over the social order, while the rest of the castes were entrusted with keeping cattle and tilling the land for the maintenances and furtherence of the interests of the society. The socially higher position of the Vaisyas in the earlier Dravidian gradation was formally recognised by admitting them into the twice-born fold, but none of the ruling privileges of the first two castes were extended to them..

Thus the caste system when it originated in the north, it appears to have originated to perpetuate a coexistence of the Aryan and Dravidian elements side by side, amalgamating the Dravidian element into the social structure conceived by the Aryans and at the same time to preserve the racial identities as far as possible. This new order quite possibly did not appeal to all sections, and people who liked an independent living of their own adventurously moved into the forests and unexplored regions of the South.

The caste structure as it was introduced in the north seems to have worked efficiently and satisfactorily that it came to be imitated a little later in the south mostly on the basis of existing professions alone. But this necessitated the introduction of a fifth caste, because the

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[1] "When the *Kshatriyas* become in any way over bearing towards the *Brahmanas*, the *Brahmanas* shall themselves duly restrain them; for the *Kshatriyas* sprang from the *Brahmanas*".
"Fire sprang from water, *Kshatriyas* from *Brahmanas* iron from stone; all penetrating force of those (three) has no effect on whence they were produced". "*Kshatriyas* prosper not without *Brahmanas*, *Brahmanas* prosper not without *Kshatriyas*; *Brahamanas* and *Kashatriyas* being closely united, prosper in this world and the next."
Sacred Books of the East, Vol. XXV, (Oxford) 1886;) '*Laws of Manu*', Ch. IX, 320—322; p. 399.

[2] "For the lord of the creatures (*Prajapati*) created cattle, he made them over to *Vaisya*; to the *Brahmanas* and the king he entrusted all created things". Loc. cit. Ch. IX, 32 7; p. 400.

[3] "The *Brahmana*, the *Kshatriya* and the *Vaisya* castes (*Varna*) are the twice born ones; but the fourth the *Sudra* has one birth only; there is no fifth caste." Loc. cit. Ch. X, 4; p. 402.

Dravidians did not want to mix with the earlier aborigines of the South, whose colour also differed from theirs. As Aryans felt a sense of superiority over Dravidians, the Dravidians in their turn felt a sense of superiority over these aborigines and more assiduously tried to keep them altogether away from their establishment. It is almost inevitable for all times, that a socially evolved people carry a sense of superiority over all other ethnic groups; and in particular within the same group the informed or the educated man carries this sense of superiority over his fellow tribesmen.

Now it is the turn of the North to imitate the South. Though they had no occasion to have a fifth caste initially, soon they had to discover that despite all their rigid stipulations, transgressions of their social order were more frequently encountered. Some of the women folk of the first two castes now and then fell into the hands of the lower two castes, a situation mortally detested by the Aryans. Total elimination of such cases by death penalty was in general very rare and these were allowed to live outside the village limits with menial professions. The Dravidian groups that accepted a subordinate position in the north, gradually lost their identity completely and fully subscribed to the Aryan impositions under the powerful impact of constancy of association. Cross-cousin marriage and burial customs eventually disappeared among them.

The hypothesis mentioned above accounts for the existing data on the caste structure of India originated in the Gangetic plains for a specific purpose during the Vedic times and was variously imitated in all other parts of the country, with reference to the professions. The absence of Anthropological affinities of the same castes in different regions is explained by this theory of the evolution of the caste structure.

The megalithic folk, who adopted the prevalent caste system from the north probably merged with the Vaisyas of the south because of their knowledge of irrigational techniques and agricultural know-how while those who wanted to perpetuate the older traditions of megalithism dwindled into a minority with petrified and stagnated development and lost their due place in the southern social order and became a jungle or hill tribe. Every illiterate tribe of India appears to be the remnant of an earlier faction of people who defied further evolution by refusing active involvement with the developing social structure. None of the finds from the megalithic tombs contain even remote traces of a script at least from the known later megaliths. The inevitable conclusion follows that the bulk of the tombs of the south were brought into existence only by petrified tribes who rendered themselves incapable of assimilating further developments of the general fabric of south Indian culture. On this count the Southern Asokan edicts apart from the fact that these were intended to guide the *Mahamatras* and other Mouryan officials, were addressed to a much more evolved people than the Megalithic folk of 3rd Cent. B.C. The almost coeval Asokan characters on the Bhattiprolu casket are unmistakable evidence that the social structure in the south was under the guidance of a literate people at least around circa 300 B.C.

There is no necessity now to stress a generally probable fact that the authors of Megaliths were Dravidians. If we are prepared to concede that the megalithic builders were already in decadent stages of evolution as early as 3rd Century B.C., their origin has to be traced to a much earlier period.

H. CHRONOLOGY

It has been generally accepted that the limits arrived at by Sir Mortimer Wheeler on the basis of evidence at Brahmagiri are no longer operative. The megalithism of the south had a much longer span than that he could visualise a quarter of a century back.

Megalithism was quite possibly an active and progressive principle till the Asokan times and its decadence and petrification is amply indicated by the fact that the megalithic folk remained illiterates even during the early centuries of Christian Era. Thus it sounds improbable that the Southern edicts were addressed even for the megalithic folk by Asoka as envisaged by Haimandorf in sharp contradiction of Wheeler's post Asokan dating. The existence of literate and progressive factors dominating the south Indian cultural plane is unmistakably evidenced by the inscribed casket of Bhattiprolu almost during the Asokan times. Megalithic builders were certainly not among them.

The emergence of iron in the north is evidenced at Atranjikera upto 1000 B.C.[1], established by radio carbon dating. But for our extra caution to accept a single instance as the determining factor for the entire north, it is becoming plain that the date of iron had to be taken back still beyond 800 cent. B.C. sooner or later. It is evident now that there is an overlap of central and western Indian chalcolithic ending dates of 7th century B.C. and the emergence of iron in the North. The Megaliths excavated at Khapa-Gangapur[2], Junapani[3] in Maharastra also give us a decisive dating to the megaliths. Dr. Deo[4] places the megaliths of Khapa-Gangapur in Nagpur Dist., between early 7th-8th centuries B.C. to 4th century B.C. He further corroborates his evidence with that of Takalghat Megalithic habitational area. Again, the affinities observed between the South Indian megalithic assemblage and the Baluchistan and Northern Iran burials, however, weak these were, suggest that the inception of megalithic burials in the South may not have had a far removed date from them.

Moreover the Red-and-black ware pottery of central Indian chalcolithic context also culminates around 8th century B.C. Setting aside the typological variation for the time being, iron smelting and Red-and-black pottery fastly made their way through central and western regions into Deccan and farther south. Now admitting roughly a half a century for the evolution and standardisation of some of the characteristic megalithic types such as saggar based Red-and-black bowls, we arrive around 750 B.C. for the appearance of South Indian Megalithic burials. But it has to be remembered that this tradition had a long span and even before 300 B.C., was tending towards a stagnation incapable of absorbing later progressive developments. In all likelyhood they jealously kept themselves outside the all pervading caste structure which totally enveloped the entire country and remained as a petrified and self-contained agricultural tribe, while their counter part which submitted

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[1] Guru Raja Rao, *The Megalithic Culture in South India*, Mysore, 1972, p. 325.

[2] S. B. Deo, *Excavations at Takalaghat and Khapa*, 1968-69, p. 14. See also M. S. Naga Raja Rao: *Megaliths of Hallur*; District Dharwar Mysore State.

[3] I.A.R., 1961-62, p. 32-34.

[4] *Ibid*; p. 13.

itself to this neo-Aryanisation eventually became the *Vaisya* caste, whose modes of disposal of their dead imbibed Aryan customs. Inhumation of burnt bones seems to speak of a transitional stage in this process. At the same time it has to be remembered that in these processes of evolution any particular transitional stage was always open to the risk of domination by too conservative elements and cause the emergence of a new tribe with a few modified customs.

The pit burial stone circles of Nagarjunakonda did not present any evidence to bring them to a later date and hence have to be assigned to the probable date of the inception of the culture itself, viz. around 750 B.C. tentatively. The pit burial cluster at site 63 also yielded a cist with a bronze armlet involving little workmanship, suggesting its primitiveness. But the cist burial tradition seems to be a little later and independent development which flourished unaffected by the side of the pit burial culture. Treating the bronze armlet as a spill over from the southern chalcolithic period, these may be assigned to around 650 B.C. admitting a time lag of three generations i.e. roughly a century for the growth of a cist constructing custom.

I. CONCLUDING REMARKS:

The foremost conclusion that follows from the excavated data at Nagarjunakonda appears to be that the megalithic tribes were not a people of a single tradition but a heterogeneous composition of more groups with different customs. The explanation for the occurrence of pit and cist burials lies basically on such a supposition. These groups were possibly had no hostilities among themselves, but peacefully lived together. The lone cist burial, Meg. VII among a pronunced cluster of pit burials suggests it. It sounds also improbable for a cist tribe to go and utilise the burial ground of an alien group of pit-burial builders for their monument. Among the 13 stone circles tackled in these operations at site No. 63, only one happened to contain a cist. It is not improbable that another one or two among the untapped 5 contained cists, but that does not alter the fact that it is essentially a pit-burial cluster.

It is also untenable to suppose that the tribe were originally cist-tribe whose decadent stages signify the absence of regular cists in view of the difficulties in obtaining slabs for the orthostats. The Megalithic monument is the consequence of a strong sentimental attachment with their departed near and dear and when the tribe was sparing no effort to form a stone circle and provide all other peraphernalia felt necessary for their departed souls, they could not have dispensed with the construction of a cist. It is therefore but probable, that the orthostats would have been brought into the valley at all costs. Even for the two cist burials these slabs must have been brought from a distance of over 25 kms. The greater frequency of the pit burial goes to suggest not only that it was a popular method of disposal but it preceeded the cist innovation. The cist facinated a section of the megalithic folk of Nagarjunakonda after they had occasion to have contact with the customs of outsiders with such a tradition. The absence of the port-hole in both the cist cases is probably indicative that these were a little more primitive and were constructed by a sect who had no knowledge either of its functional value or of its religious connotation.

But, this does not mean that every pit burial is earlier to every cist. It is erroneous to suppose that a new custom completely superceeds an earlier tradition. Only a liberal section adopts now and then a new innovation but the conservative section dogmatically adheres to the original practices. Thus both must have survived side by side and possibly with perfect harmonious relations with each other, religious intolerance and fanaticism being of a much later origin in the Indian sub-continent.

The alignment of the pit line presents another curious but interesting feature. The deviations observed on either side of the Magnetic north-south line are too pronounced to be disposed off as inevitable errors beyond the determination and judgement of a primitive tribe. Their means of determining the cardinal directions had to be in relation to the sun's diurnal motion. As the position of the sun alters between the Summer and Winter solstices, the pit line also possibly registered a corresponding inclination. The northern and southern inclinations are probably indicative of the summer and winter seasons when the pits were excavated, while the central positions of the pit lines are indicative of the equinoxial conjunctions of the sun, corresponding to the autumn and spring seasons. Data collected from a good number of Megaliths located at one site only have to be examined in this light whether such seasonal variation had its corresponding reflection over the interred peraphernalia, such as a profussion of pots of grain indicating a rich harvest associated with pit lines with a southern inclination, and a modest fulfilment of a sentimental obligation during the lean months when the pit line is found inclined towards North by placing comparatively fewer pots of grain. Sampling to asseertain whether the excavated evidence is in conformity with such a supposition has to be made at a single site or differentsites not far from one another, but the epoch of time elapsed should not exceed a span of say 3 generations or so i.e., roughly a century. Then the parameters involved remain suitably within the excavators' comprehension. Only 13 megaliths were tapped at the cluster of site No. 63 which contained 18 stone circles. Apart from the cist variant, among the rest, 5 have their pits east-west oriented, while only seven have their pits along north-south. It is unscientific to compare the data of East-West oriented pits with that of North-South variants, for the simple reason that we cannot be sure that their sentimental obligations with regard to their dead were the same in both cases because these differed with regard to the direction initially. Thus the number of a single type dwindle into an insignificant figure precluding a statistical comparison of contents. This interesting feature has to be given weight to in future collective megalithic investigations.

Now comes the question of the largest stone circle in the cluster at site 63, which has no finds but for two small splinters of bones. When Wheeler encountered a similar circumstance at Brahmagiri (Meg. III), he presumed that it was robbed[1]. He did not elaborate the details or what was actually found. In case there were no pottery or bones, it becomes difficult to guess the motive of a thief who had no sentimental attachment towards them. He would not have bothered to remove bones and pottery which were of no intrinsic value.

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[1] *Ancient India*, Vol. IV., p. 194.

So, robbing cannot be presumed as a probable cause for the emptiness of Meg. IV of Nagarjunakonda. Probably it connotes a migration of the family, who were responsible for its construction and at that time carried away the contents of the megalith owned by them. Sometimes even sharing of ancestral property takes place among the kith and kin of the deceased before a section decides to migrate elsewhere and in such cases it may not be improbable they used to share even the contents of a megalith hitherto jointly owned by them. Megalith III of Sanur, reported 'peculiar' by Dr. Banerjee[1] may have been such a case. It goes to mean that a Megalithic monument was treated as a piece of property and the decendents or the relatives of the deceased felt it obligatory that they should preserve this association with their dead even when they chose to migrate elsewhere. Such notions of ownership are consistent with the innovators of the agricultural techniques. Before the full fledged emergence of agriculture, ownership was a vague notion confined only to the animal hunted by a person. When preservation of the harvest became necessary for the lean months that follow, this notion of ownership seems to have evolvod into a more concrete form and soon ownership of the very strip of land cleared for cultivation was claimed and jealously guarded. Harnessing irrigational fecility therefore follows this notion of ownership. By a natural extension of these ideas for what they considered to be the permanent parts of their dead, viz. the bone remains, elaborate and extensive arrangements were made to preserve them. A sentimental extension of the idea of ownership over the non-utilitarian objects by a primitive tribe possibly forms an interesting field of investigation for a social Anthropologist and incidentally it may be viewed as a facet of the urge for the artistic expression inherent in man. Clearly the paste beads in the neolithic graves and the occasional appearance of a variety of beads in megaliths speak in support of such an urge and the upper palaeolithic cave paintings carry it even into the far remoter times.

Golden finds are generally rare in megalithic burials and seem to occur only when the builders had found it sporadically and almost in a pure state along with the iron ore which they had already mastered to smelt and obtain the metal. Even otherwise as hoarders of grain, these megalithic folk were the progenitors of a primitive commerce and accepted gold in exchange of their excess grain now and then. Gold diadems were unearthed from the urn burials of Adichennalur, consisting of thin elliptical leaves; some of them had thin wiry projections along the major axis provided with minute appertures to fecilitate running a thread through, to fasten over the fore-head or hand. The incised ornamentation was indicative of their primitive character with simple oblique strokes, dots and triangles. A stone pendant covered by a thin sheet of gold was one among the golden finds illustrated by Rea[2]. Beck reported golden annular beads from Moulali from the outskirts of the twin cities of Hyderabad-Secunderabad. An admixture of silver was detected in some of the larger samples[3].

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[1] *Ancient India*, Vol. XII, p. 29.

[2] Alexander Rea, *Annual Report of Archaeological Department*, Southern Circle, Madras and Coorg, p. 7, cited by Guru Raja Rao ; *op. cit*, p. 282.

[3] Guru Raja Rao, *B. K. Megalithic Culture in South India*, Mysore 1972 p. 272 & 278.

The golden objects of Nagarjunakonda megalith include two sprial shaped ear-rings alongwith 35 small cylindrical beads of thin sheet gold. An alloy of silver was used for the manufacture of 18 spacer beads exactly similar in shape to golden samples. Use of a silver alloy for the manufacture of beads is far more rare than gold and the finds of Meg. XIV may be treated as specimens encountered for the first time. Use of silver strongly speaks in favour of trade contacts, as silver does not occur in a native state as in the case of gold. Thus having had a reason to presume outside contacts at least occasionally for the megalithic folk of Nagarjunakonda, one can presume that their customs might have undergone some modifications under the external influence. Yet the absence of porthole in either of the cist burials suggests a remoter date of their construction.

The armlet of brass from Meg. VII is another of the singular features in evidence at Nagarjunakonda[1]. Once again Adichennalur and Nilgiris offer parallel examples of Bronze items though involving greater craftmanship and still in production techniques. The workmanship in the Nilgiri finds is being accounted for by assuming trade contacts with the mediterranean cultures[2]. But the lone specimen with no decorative feature of Meg. VII was undoubtedly a local production and possibly suggests the conclusion of a chalcolithic period from which it may have been a spill over, as copper-fillings were already reported in evidence in a neolithic context by Soundera Rajan. The dearth of bronze and copper items is to be attributed more to the absence of copper deposits in and around the valley in particular and the scarcity of both copper and tin in general all over the south, rather than glossing over the chalcolithic problem. Again the appearance of only ornaments and ultilitarian items and not arms of defence in the megalithic context is too significant to be lightly viewed. On this score alone the bronze finds of megaliths seem to connote the beginning of the end of a chalcolithic period and local iron deposists effectively answered the need of defencive objects fairly early. Almost an identical item was in evidence at Brahmagiri.

Now, a few comments about the iron implements found invariably in all the megalithic burials are to be added. The presence of iron seemed to imply a later date in general for these monuments from a long time,—at least from the day these burials seriously confronted the modern archaeologist, as an elusive problem of the South. A revision of this notion is long due, as it served only as a bias of little usefulness. If we are prepared to accept 8th cent. B.C. to be the date of the emergence of iron in the north-for the time being not considering the date of 1000 B.C. from Atranjikera—why should the southern date be-far removed from it? We have no evidence at all to presume any sharp break in the continuity of North-south contacts at any period and an important and revolutionary discovery had every reason to travel faster to the South, when compared to some of the traditional customs of merely sentimental import. At the same time, we do not encounter any culture associated with iron and preceeding megalithism in the south. Hence, on the precise determination of the date of commencement of the use of iron in the north, depends the emergence of megalithism in the south, possibly differing from it by a few decades. Here again caution is neces-

[1] *Ancient India*, Vol. IV, Fig. 41-6, presents almost an identical example at Brahmagiri

[2] *Loc. cit.*, pp. 270—271.

sary to observe that we have no substantial evidence to suppose that its use was communicated definitely from the North.

Iron armaments in the burials clearly point out that these were designed for purely defencive purposes against the enimies of the deceased. Who these foes could be? They were certainly not among the supernatural entities worshipped by the megalithic folk. It was ever the human habit to try only appeasement tactics with supernatural forces from times immemmorial, when he felt that these were angry with him. The answer seems to be only in the fact that the megalithic people were predominantly agriculturists. They used to store their grain for lean months and never suffered hunger and quite often these were in a position to trade their excess produce. As hoarders of grain, they had enemies all around; in those, whose profession was principally cattle keeping and hunting which was already becoming a more hazardous way of living compared to agricultural occupation. A deep defensive conciousness was quite possibly instilled by frequent attacks over the megalithic settlements; and carrying defensive weapons eventually had become part of megalithism. As food materials were felt necessary in the burials so were the iron arms. In all probability some of the megalithic burials were constructed over the remains of those who were killed in sudden encounters. The consequent delay in giving a regular burial for them in accordance with their customs in such cases becomes self-explanatory and ultimately results in secondary burial. The iron arms tacitly suggest the warrior qualities of megalithic folk constantly threatened by sudden attacks so that placement of arms also in the burials became part of the ceremonial way of disposing the dead. The need for arms was felt so strongly by them definitely because of too frequent attacks by others who were not by themselves agriculturists.

Inventing an elaborate and difficult burial proceedure *a fortiori* implies considerable leisure for the megalith builders pointing out their prosperity and plentitude. It was but natural that their way of living was mortally grudged by others whose mainstay of living was cattle keeping.

Among the pottery finds, one feature which needs special mention is that the ring-stand most common among the pit burials was totally absent in the two cists in Megs. I and VII. The classification that the pit and the cist orginate from different traditional customs is thus amply justified by this marked difference in the finds and the pit should not be construed as a decadent stage of the once elaborate cist. The elongated stand of red ware here differs from the shorter black ware stands all over the south, occuring in cist burials. The red-and black-ware pottery of course is a common feature of both variants. Not much of a comment is called for on this universal feature. Though it is now known that the Red-and-black ware pottery results essentially by three different techniques, viz. (i) Inverted firing, (ii) Straight firing; and (iii) Double firing, the megalithic Red-and-black variety was confined to the first method of manufacture only. The products manufactured by inverted firing have red colour in the bottom of the samples, only the top and interior presenting thick black colour often with a little lustre also, depending upon the quality of clay and the slip applied. The red and black samples occuring in a non-megalithic context

generally imbibes the other techniques[1] also. The characteristic megalithic types confiend to the technique of inverted firing present the unending continuity of these types throughout the megalithic period which is certainly not as short as hitherto beleived. The occurence of Red-and-black ware samples in those of earlier periods in the north, including Harappan bearing, is positive proof that the technique at least originated there. The manner and method by which it travelled to south and captivated the imagination of the megalith builders to such a great extent that it was adopted as a characteristic and permanent feature of their culture needs a separate and comprehensive investigation. It may denote an exodus of certain ethnic groups lock stock and barrel towards the south through Central India which might have served as a shelter for a specific period till new forces came into play pushing them further south beyond the Deccan. Even typological affinities can be discernible between the earliest megalithic pottery of the south and central Indian black and-red ware which was to offer the links between the north and the south. Considering the chronological gap between the early black-and-red ware specimens in the north and the earliest megalithic finds of the south, it is not difficult to guess the existence of an intermediary culture which must have flourished in the central region and also served as a carrier of the technique of inverted firing. Western India also played a significant role as a cultural link between the north and the south via the Deccan from the earliest historic times and there is no reason why it should not have had answers to some of our chalcolithic and protohistoric spread and distribution problems. An assesment of the megalithic culture of Vidarbha may extend the earliest megalithic date of the South to still remote periods and at the same time bring to light link evidence hitherto remained unnoticed.

The bone remains were observed to be too fragmentary in general and do not readily admit of any positive inference to be drawn from them. Only uncalcined bones were met with consistently which suggest an earlier date for reasons already stated above.

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[1] Dr. Krishna Murthy, K. had noticed this fact while he was dealing with Nagarjunakonda pottery types and other Black-and-red ware of the early historical period at the sites like Salihundam etc.

APPENDIX-A

LIST OF SITES:

Site No. 23, Sector N XX: This was a monastic complex of the *Ikshvaku* period, i.e. *Circa* 3rd Century A.D., situated in the North Western region of the Valley. The monastery comprises of a three winged *vihara* and a central *Mantapa* the entire unit facing a rubble *Stupa* and five brick votive *Stupas* on the southern side. A rivulet meandering these structures before joining the river partly washed out the *stupa*.

Site No. 44, Sector N V: A Megalithic cluster possibly belonging to a cist burial tradition. A.H. Longhurst excavated one of these tombs as early as 1927. It was not possible to arrive at the total number of tombs here, because, the later monastic complex crowning the hill *Kshuludhammagiri*, on the southern slopes of which the site was situated, very likely utilized the boulders of these burials for forming a pedastal for its *stupa*.

Site No. 45, Sector S VI: Situated somewhat centrally with a shift towards North-west in the Valley; it yielded potsherds in association with microliths and hence believed to be of an early neolithic phase.

Site No. 45A, Sector N V: A microlithic site on the foot of Phirangimotu hills and a little towards North-west of site No. 45. The microliths here were not associated with potsherds.

Site No. 46, Sector N V: A neolithic habitational complex in the South Eastern corner of the sector located somewhat centrally in the Valley.

Site No. 46A, Sector S VI: A South-western extension of the above site with a dense distribution of pits, one of which yielded an articulated human skeleton.

Site No. 47, Sector N VI: A north-western extension of Site No. 46, with a distribution of pits.

Site No. 53, Sector S XVII: A microlithic habitation in the south eastern region of the valley, where the bed-rock was exposed as a sheet leaving small soil pocket-accumalations around.

Site No. 63, Sector S IV: The major Megalithic cluster in the south western region of the valley with 18 megaliths of which 13 were excavated in the final phase of excavations. But for a single cist-burial the rest were pit-circles and hence this was termed as a pit-circle cluster.

Site No. 68, Sector S XII: The neolithic grave-yard yielding as many as 10 human skeletons in association with spouted vessals and paste beads; situated in the south-western corner of the valley and was away from the course of the river by 150 metres.

Site No. 76, Sector S XII: Situated towards the west of Site No. 68, it was an early medieval pit area and Meg. III was located in the Southern region of this site.

Site No. 128, Sector N XXIV: The Early Stone Age, Site in the North Eastern corner of the Valley, where stratified examples of Early and Middle Stone Ages were unearthed. The strata comprised alternatively by river pebbles contributed by the river and sub-angular stones rolled from the Western bordering hills.

APPENDIX-B

RADIO CARBON DATINGS

Lab Sample No.	Period & Culture	Date 5568	Date 5730	B.C., A.D. Based on 5730	Sample	Lucus	Depth	Field No. or Sample No.	Remarks
TF-74	Neolithic	1900±95	1955±100	5 B.C.	Soft sponzy human bones	Grave 8 Skeleton-10	50 cm	— —	Current Science Vol.33, No. 2; 1964. pp.40-42
TF-63B	,,	1750±100	1805±105	45 A.D.	,,	Grave-5 Skeleton-7	35 cm	—	Ibid
TF-30	,,	1535±95	1580±100	370 A.D.	Animal bones	Site 46 NV/36, Tr. A3 pit 4A	1,2 to 1.50 cm	—	Ibid
TF-72	,,	1525±95	1570±100	380 A.D.	Soft sponzy human bones	Grave-6 Skeleton-8	52 cm	—	Ibid
TF-73	,,	1495±105	1535±100	415 A.D.	,,	Grave-4 Skeleton-6	40 cm	—	Ibid

The Base year for purposes of calculation was taken to be 1950

APPENDIX-C

MECHANICAL ANALYSIS OF SOILS

Percentage of Soil contents of samples from Nagarjunakonda; Laboratory work

Sample			Sand			Silt				Sorting							
No.	Sample	Period	Coarse	Medium	Fine	Coarse	Medium	Fine	Clay	Median	Coeff.	Colour	pH	Phosphate	Organic matter	Carbonate	Description
							SITE No. 23										
1.	Soil from pit inside stupa	Early historic	6	21	20	9	16	28	—	·04	6·06	Grey	Alkaline	Nil	3·72	present	Silty sand
2.	Soil from pre-stupa layer	-Do-	3	20	27	10	40	—	—	·06	1·34	-Do-	-Do-	-Do-	2·94	-Do-	-Do-
3.	Soil from Black-silty layer with bones sealing the stupa.	-Do-	6	20	20	7	29	18	—	·04	5·68	-Do-	-Do-	-Do-	3·48	-Do-	-Do-
							SITE No. 45										
1.	Earth from layer 4	Microlithic	11	22	19	11	37	—	—	·07	4·70	Blackish Brown	-Do-	-Do-	3·72	Absent	-Do-
2.	Semi-weathered sterile rock.	-Do-	11	22	16	6	45	—	—	·04	4·96	Brown	-Do-	-Do-	3·74	-Do-	-Do-
							SITE No. 53										
1.	Earth from layer 1	-Do-	10	29	35	13	13	—	—	·14	2·43	Brownish Red	-Do-	-Do-	3·05	-Do-	-Do-

2.	Earth from layer 2	-Do-	17	34	22	8	19	—	—	·21	3·13	-Do-	-Do-	-Do-	3·70	-Do-	-Do-
3.	Earth from layer 3	-Do-	20	25	17	6	32	—	—	·15	6·20	-Do-	-Do-	-Do-	3·70	-Do-	-Do-
4.	Earth from layer 4	-Do-	19	24	17	5	35	—	—	·13	6·45	-Do-	-Do-	-Do-	3·68	-Do-	-Do-
							SITE No. 46										
2.	Earth from layer 3(natural) soil)	Neolithic	5	13	24	13	17	25	3	·03	5·47	Whitish Brown	-Do-	-Do-	3·63	Present	Loam
							SITE No. 46-A										
1.	Natural rock in contact with pit 1	Neolithic	16	30	27	8	19	—	—	·17	3·00	Brown	Netural	1	3·67	Absent	Sility sand
3.	Earth from layer 3 in contact with pit 1	-Do-	10	23	26	11	30	—	—	·10	4·13	Brownish Red	Alkaline	Nil	3·14	-Do-	-Do-
4.	Dark borwn soil (natural) below pit 1	-Do-	9	17	22	10	42	—	—	·05	3·74	Brown	-Do-	-Do-	2·81	-Do-	Sandy silt
5.	White gravel disintegrate rock below pit 1	-Do-	10	14	17	9	50	—	—	·02	3·87	Greyish White	-Do-	-Do-	3·74	present	-Do
							SITE No. 47										
1.	Soil below Neolithic pit	-Do-	4	12	18	10	28	30	—	·01	4·2	Whitish Brown	-Do-	-Do-	3·63	-Do-	-Do-
2.	Ashy Earth from pit 2	-Do-	4	14	31	19	32	—	—	·05	3·16	Greyish White	-Do-	2	2·05	-Do-	Sility sand

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iii	20	inden	index
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1	36	Foot	Foote
5	11	Carnivorus	Carnivorous
8	9	Cuddpah	Cuddapah
8	10	Krishan	Krishna
8	28	felspar	feldspar
15	19	titiated	titrated
15	25	2 & 1	3 & 1
17	22	is is	it is
22	13	Shalley	Shaly
24	32	pebbled	pebble
28	28	Vall River	Vaal River
31	28 column 2 bottom	—	2
51	32	median	medial
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97	40n	Gardner	Gardener
100	40n	*Untur*	*Utnur*
101	18	Navdatoli	Navadatoli
104	39n	*Baluchinstan*	*Baluchistan*
106	38n	Nevesa	Nevasa
116	26	Tekalkota	Tekkalakota
121	19	Tekalkota	Tekkalakota
122	33	Sanganakellu	Sanganakallu
124	27	virture	virtue
127	2	Sigbhum	Singbhum
130	31	artithmetical	arithemetical
131	Table III, 2nd column	Trepesoidal	Trapezoidal
131	Table III, 12th column 4th item	2	×
131	Table III, 13th column 4th item	×	1
142	Table V, 9th column	blades } blades	blades
142	Table V, 12th column	Scarper	Scraper
144	15	Fake	Flake

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149	Table VII, 10th column 4th item	174	175
149	Table VII, 10th column 6th item	—	80
163	Table IX, 11th column 4th item	—	1
163	Table IX, 12th column 5th item	1	—
163	Table IX, 13th column 5th item	2	1
163	Table IX, 14th column 5th item	—	2
165	14	XII & VII	XIV & VII
176	32	spindle	spindle whorl
180	22	rubble and	rubble,
184	2	schemetic	schematic
184	8	No. 63	No. 68
184	18	Soundera Rajan	Soundara Rajan
196	40	sagger	saggar
198	3	Mask	Maski
202	33	Fairservice	Fairservis
203	4	Haimandorf	Haimendorf
205	3	Haimandorf	Haimendorf
205	37n	*Takalaghat*	*Takalghat*
208	14	evolvod	evolved
209	13	still	skill
209	18	Soundera Rajan	Soundara Rajan
211	1	confiend	confined
Illustrations :			
Fig. 38	Top	EARLY	MIDDLE
Pl. XVI	Caption	see p. 3	see p. 30
Pl. XLVII	Caption	Neo. 11	Ngk. Neo. 11
Pl. XLVII	Caption	Skull Ngk.	skull
Pl. XC	Caption	graffite	graffiti
Pl. XCIX	Caption	Meg. XIV, or	Meg. XIV;

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Fig. 1. Valley map showing division into sectors. *See p.1*

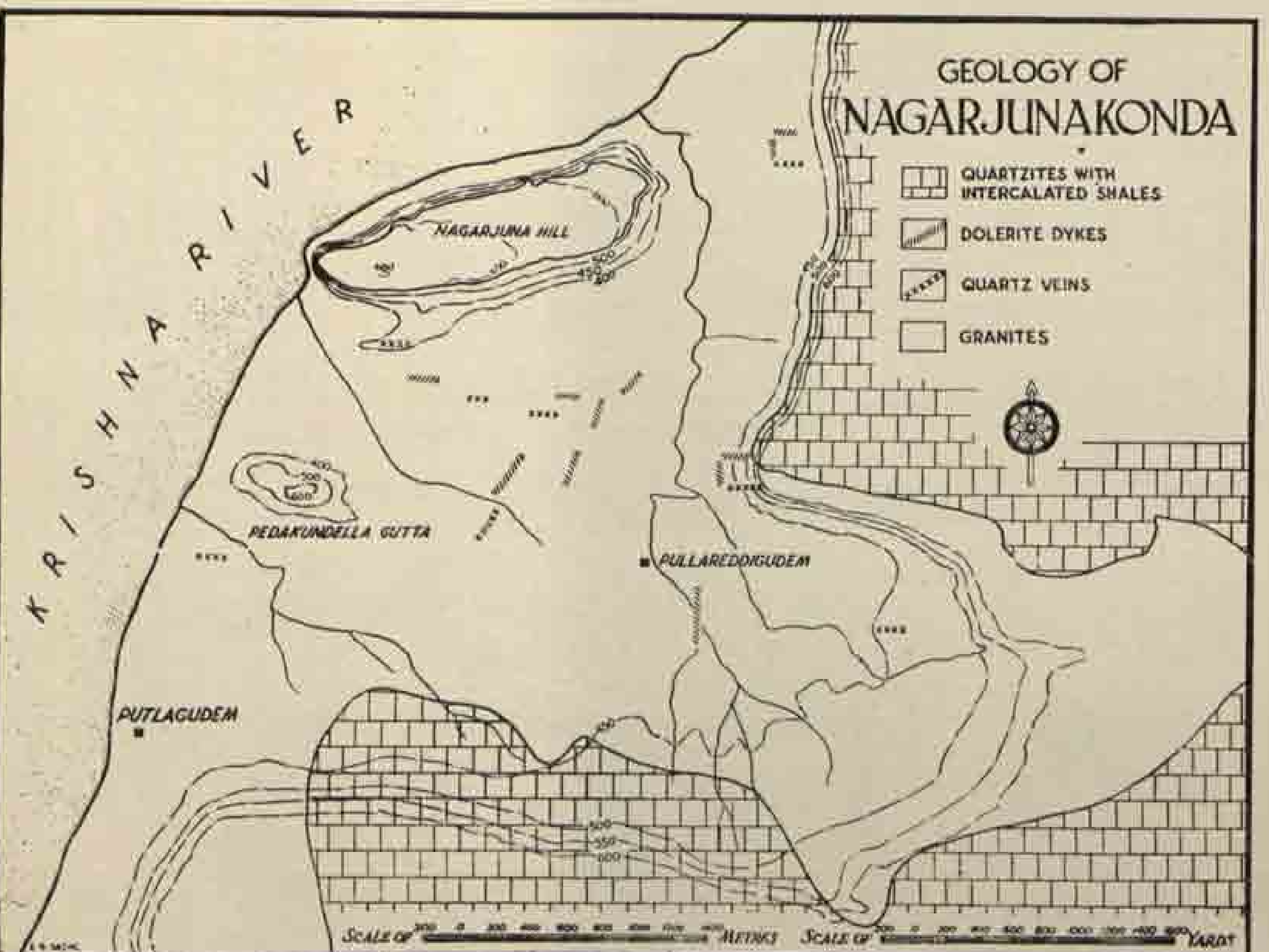


Fig. 2. Geology of Nagarjunakonda. See p.8

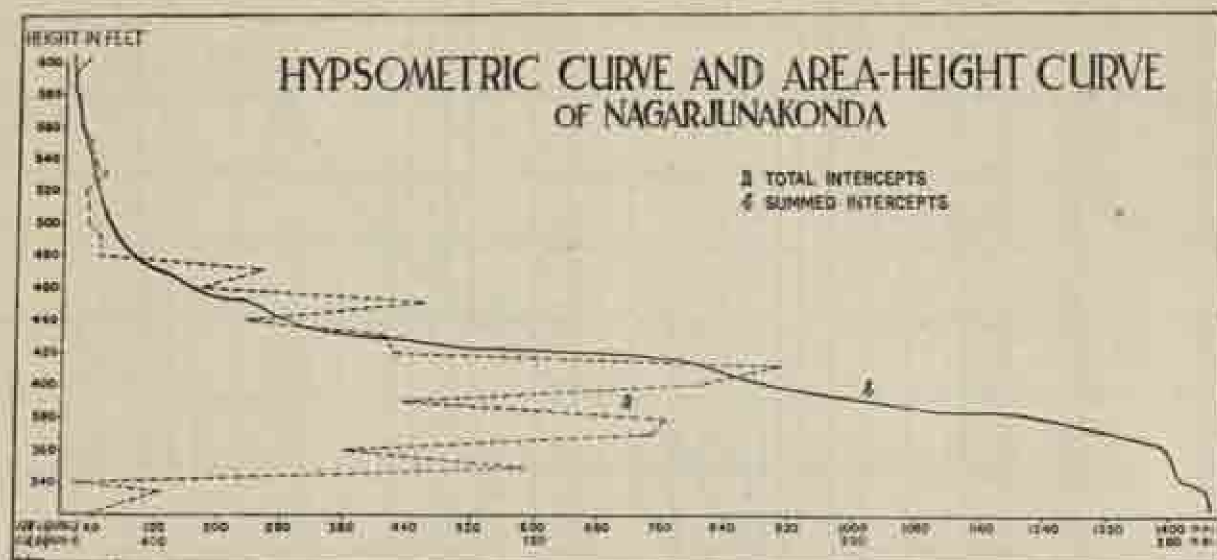


Fig. 3. Hypsometric curve and Area-Height curve of Nagarjunakonda. See p.14

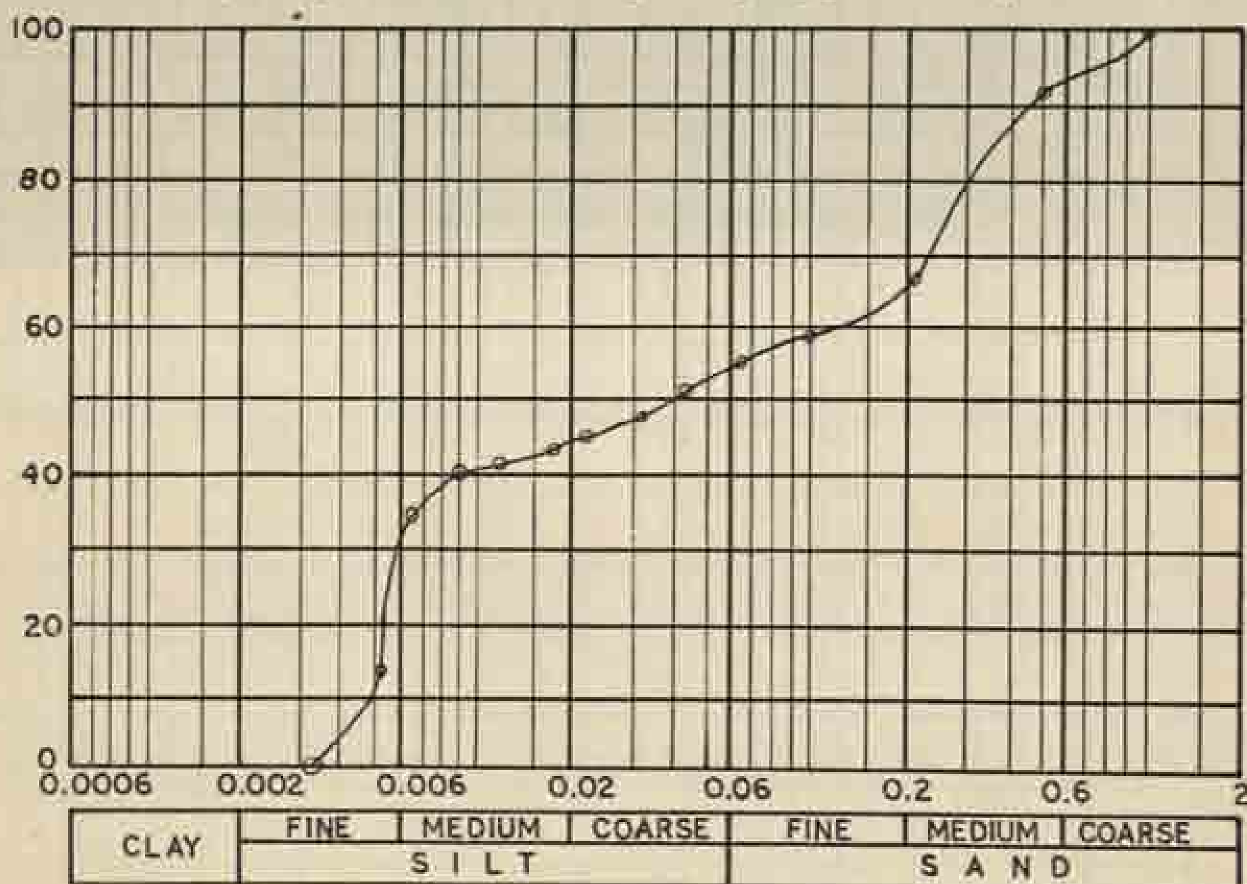


Fig. 4. Site No. 23, Sample No. 1, Cumulative Curve. See p.15

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 5. Site No. 23, Sample No. 2, Cumulative Curve. *See p.15*

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 6. Site No. 23, Sample No. 3, Cumulative Curve. *See p.15*

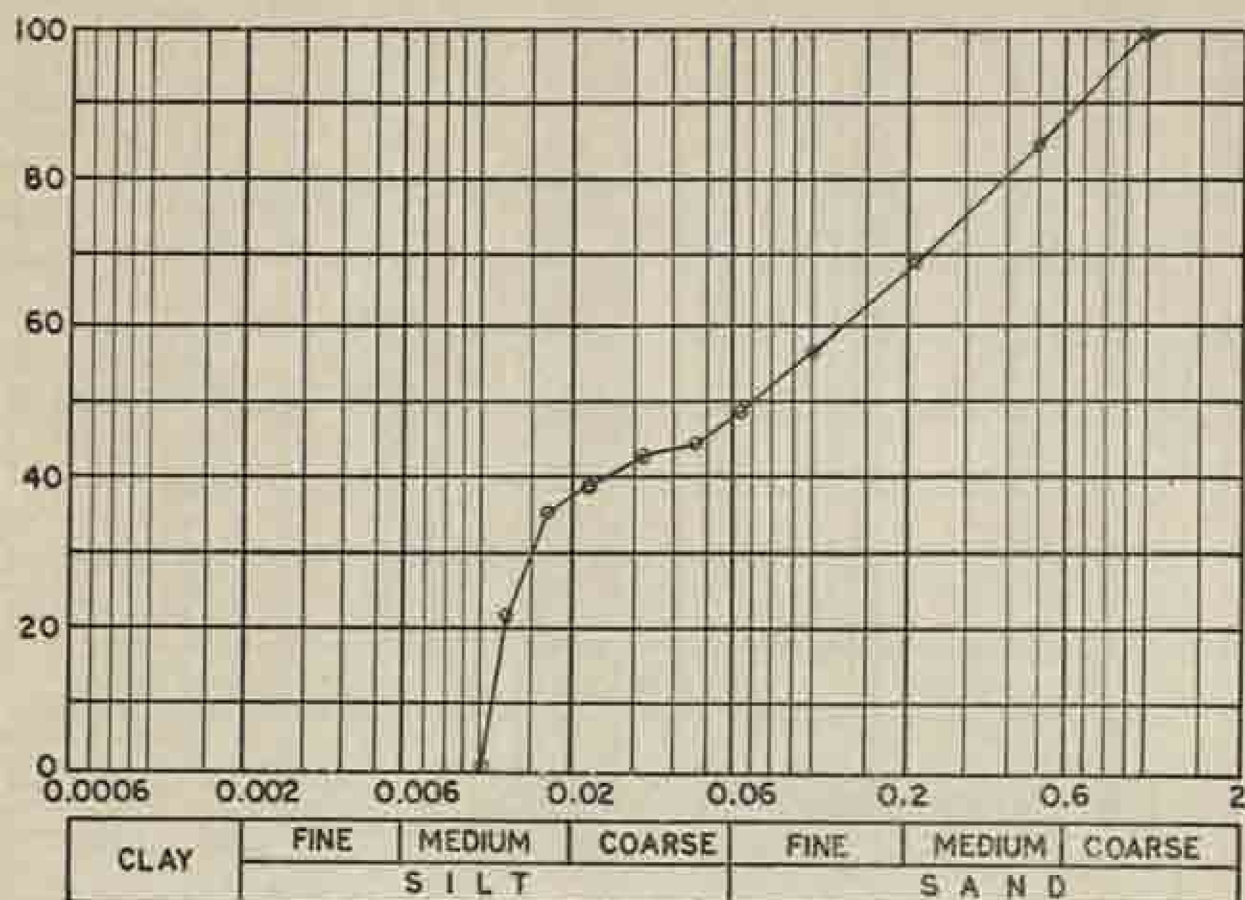


Fig. 7. Site No. 45, Sample No. 1, Cumulative Curve. See p.16

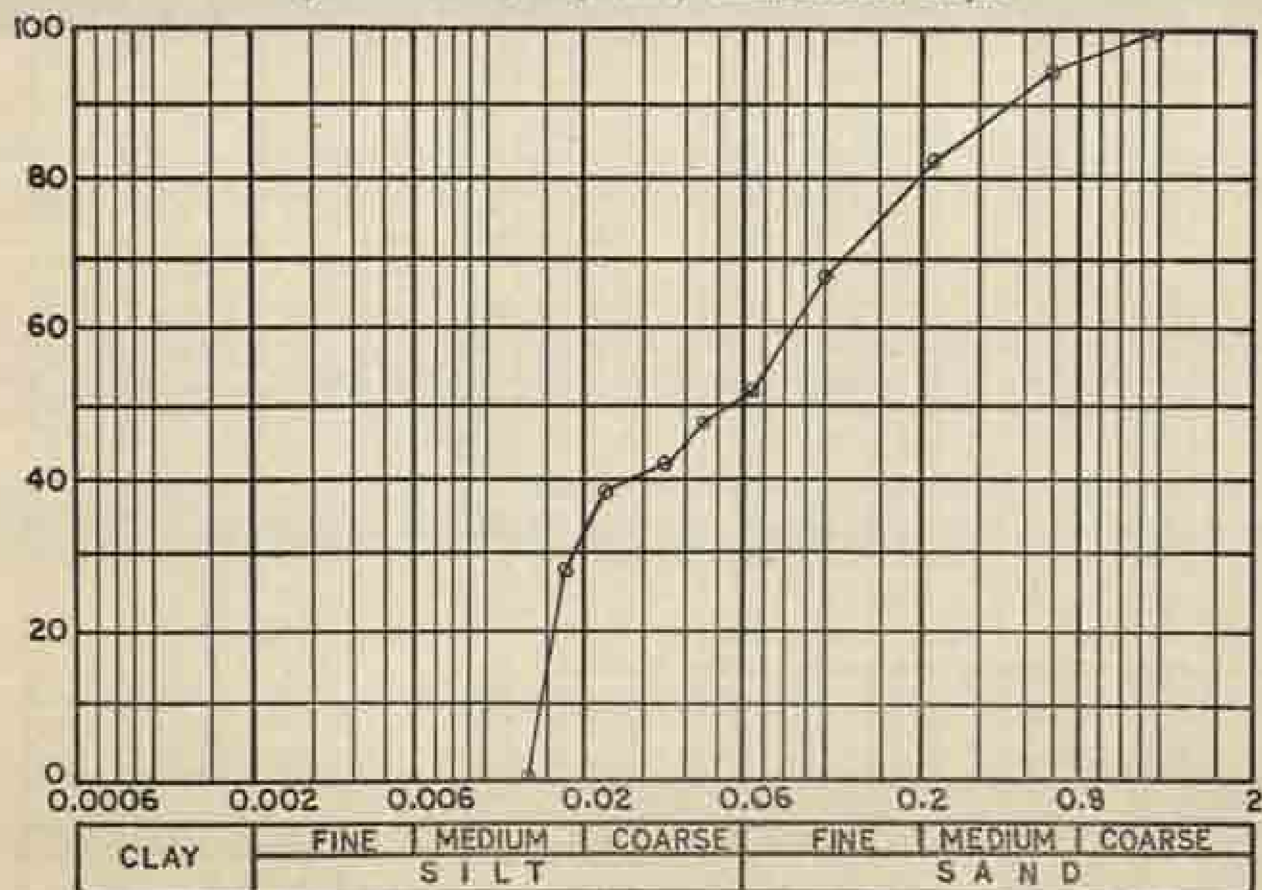


Fig. 8. Site No. 45, Sample No. 2, Cumulative Curve. See p.16

Fig. 9. Site No. 53, Sample No. 1, Cumulative Curve. *See p.16*

Fig. 10. Site No. 53, Sample No. 2, Cumulative Curve. *See p. 16*

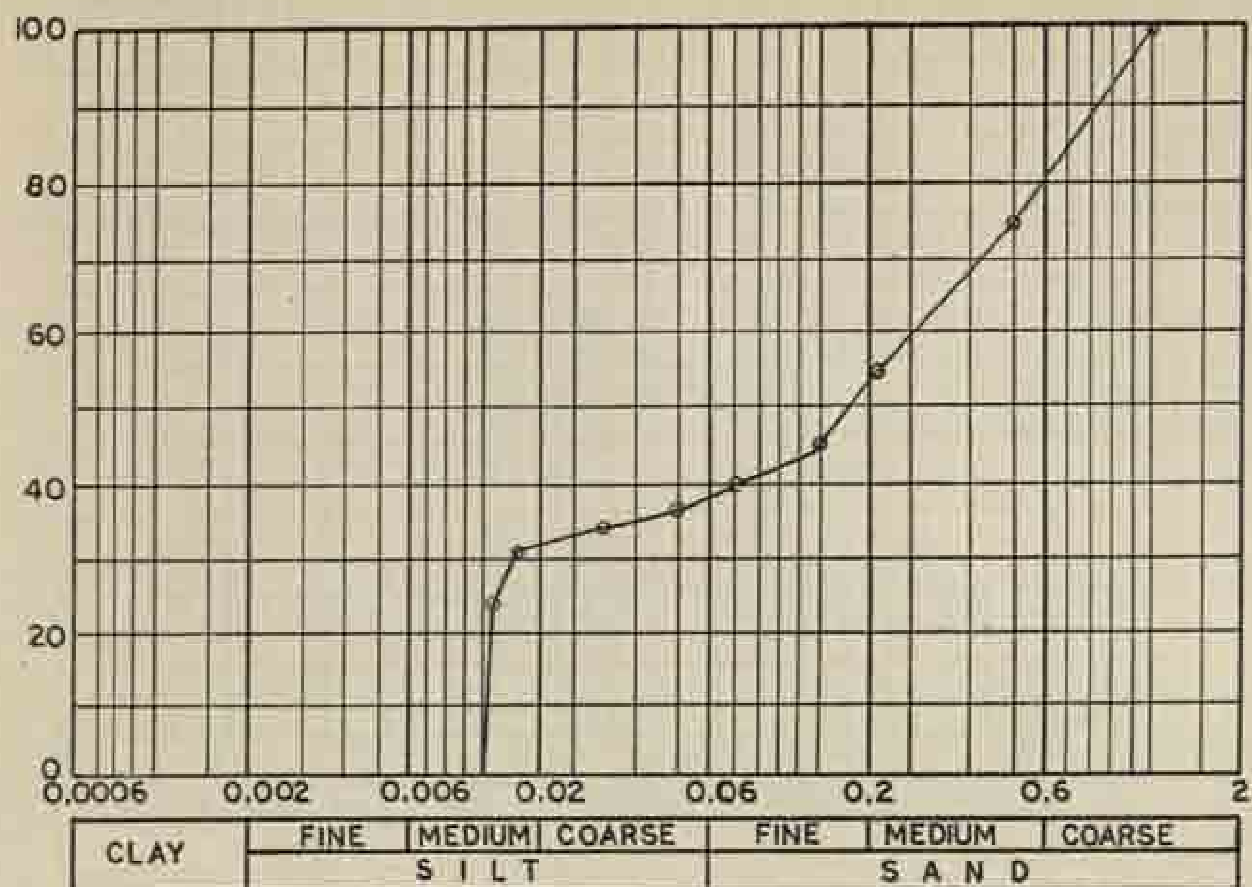


Fig. 11. Site No. 53, Sample No. 3, Cumulative Curve. *See p.16*

100
80
60
40
20
0
0.0006
0.002
0.006
0.02
0.06
0.2
0.6
2
CLAY
FINE
MEDIUM
COARSE
SILT
FINE
MEDIUM
COARSE
SAND

Fig. 12. Site No. 53, Sample No. 4, Cumulative Curve. *See p.16*

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 13. Site No. 46, Sample No. 2, Cumulative Curve. *See p.16*

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 14. Site No. 46-A, Sample No. 1, Cumulative Curve. *See p.17*

100
80
60
40
20
0
0.0006
0.002
0.006
0.02
0.06
0.2
0.6
2
CLAY
FINE
MEDIUM
COARSE
FINE
MEDIUM
COARSE
S I L T
S A N D

Fig. 15. Site No. 46-A, Sample No. 3, Cumulative Curve. *See p. 17*

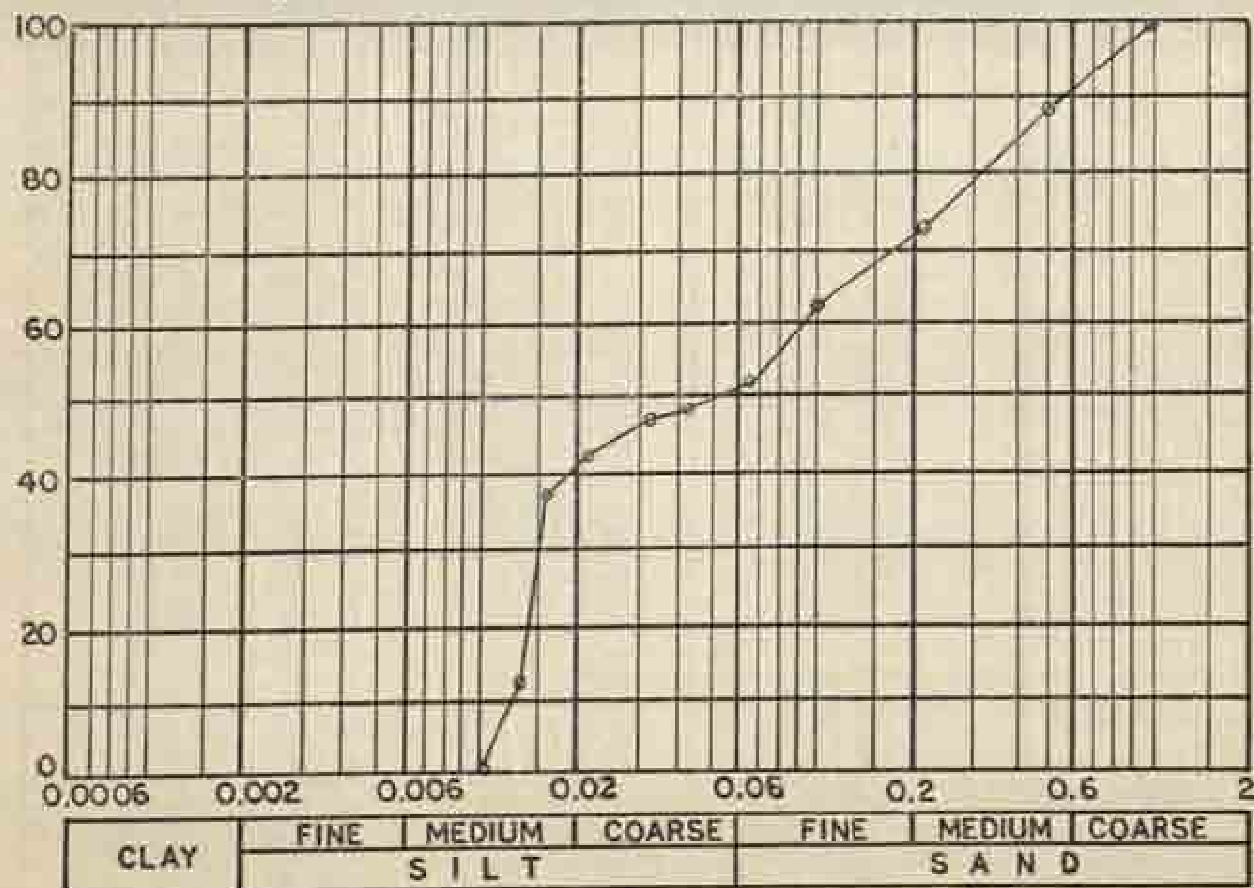


Fig. 16. Site No. 46-A, Sample No. 4, Cumulative Curve. *See p. 17*

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 17. Site No. 46-A, Sample No. 5, Cumulative Curve. *See p. 17*

100
80
60
40
20
0
0.0006 0.002 0.006 0.02 0.06 0.2 0.6 2

CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND		

Fig. 18. Site No. 46-A, Sample No. 6, Cumulative Curve. *See p. 17*

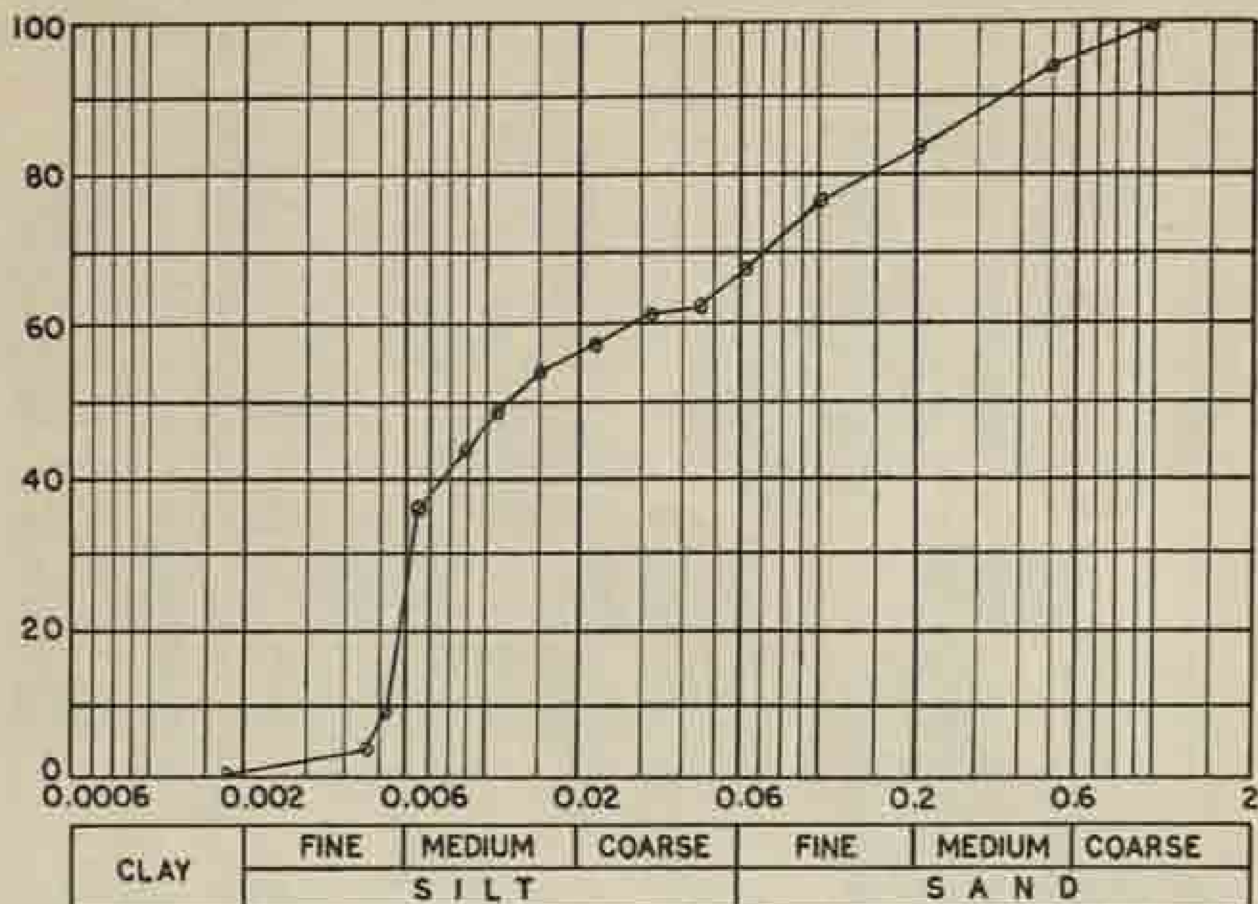


Fig. 19. Site No. 47, Sample No. 1, Cumulative Curve. *See p. 17*

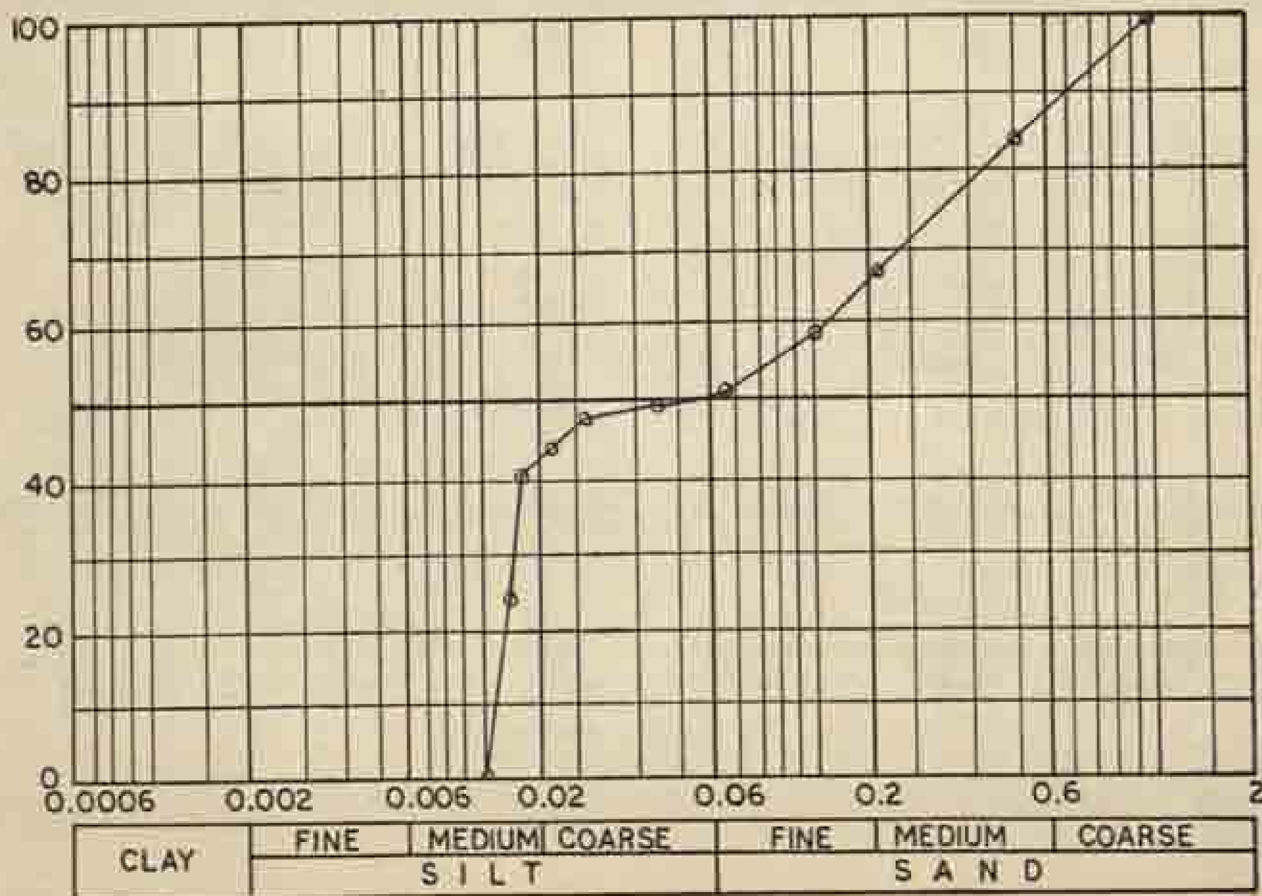


Fig. 20. Site No. 47, Sample No. 2, Cumulative Curve. *See p. 17*

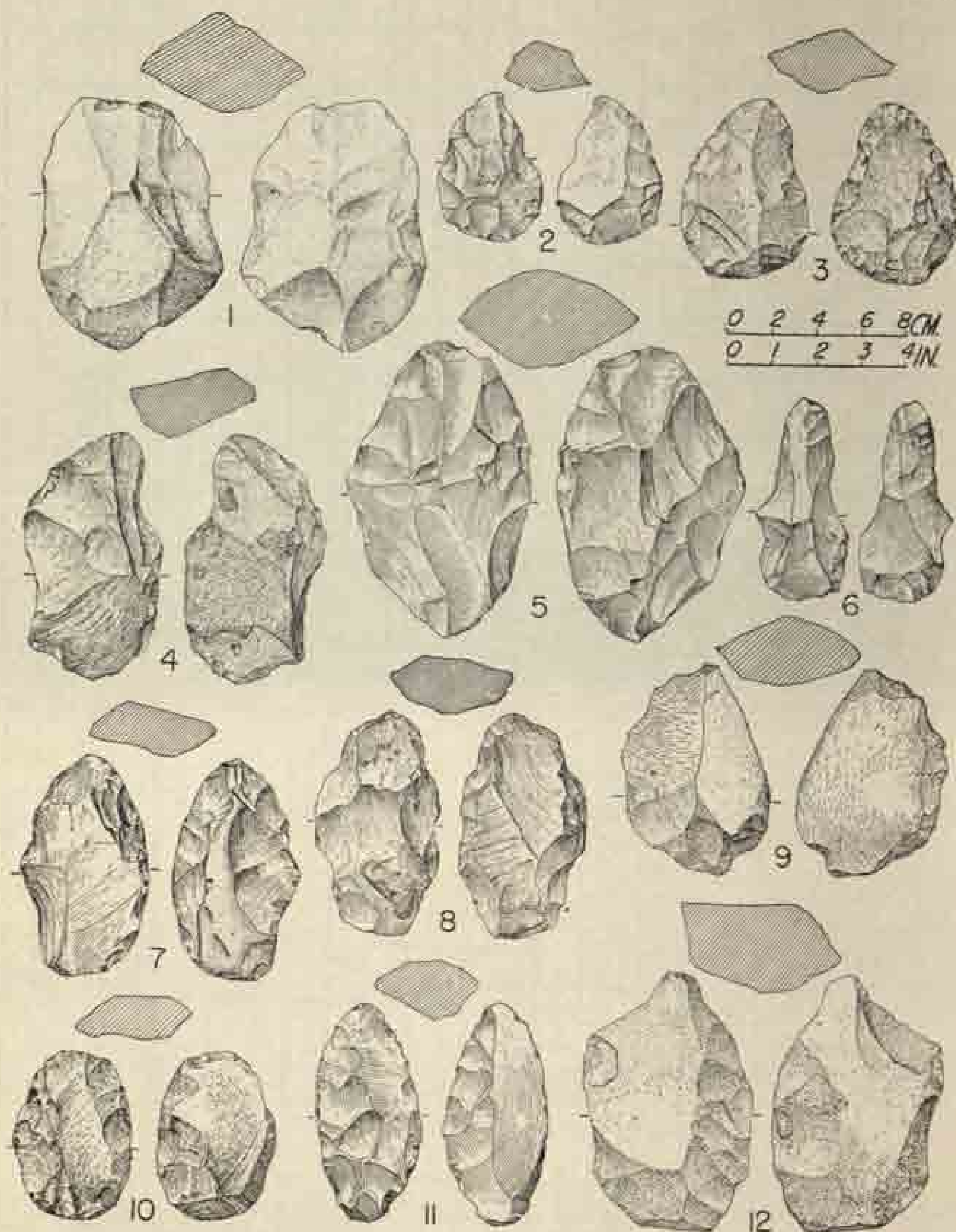


Fig. 21. Hand Axes. *See p. 26*

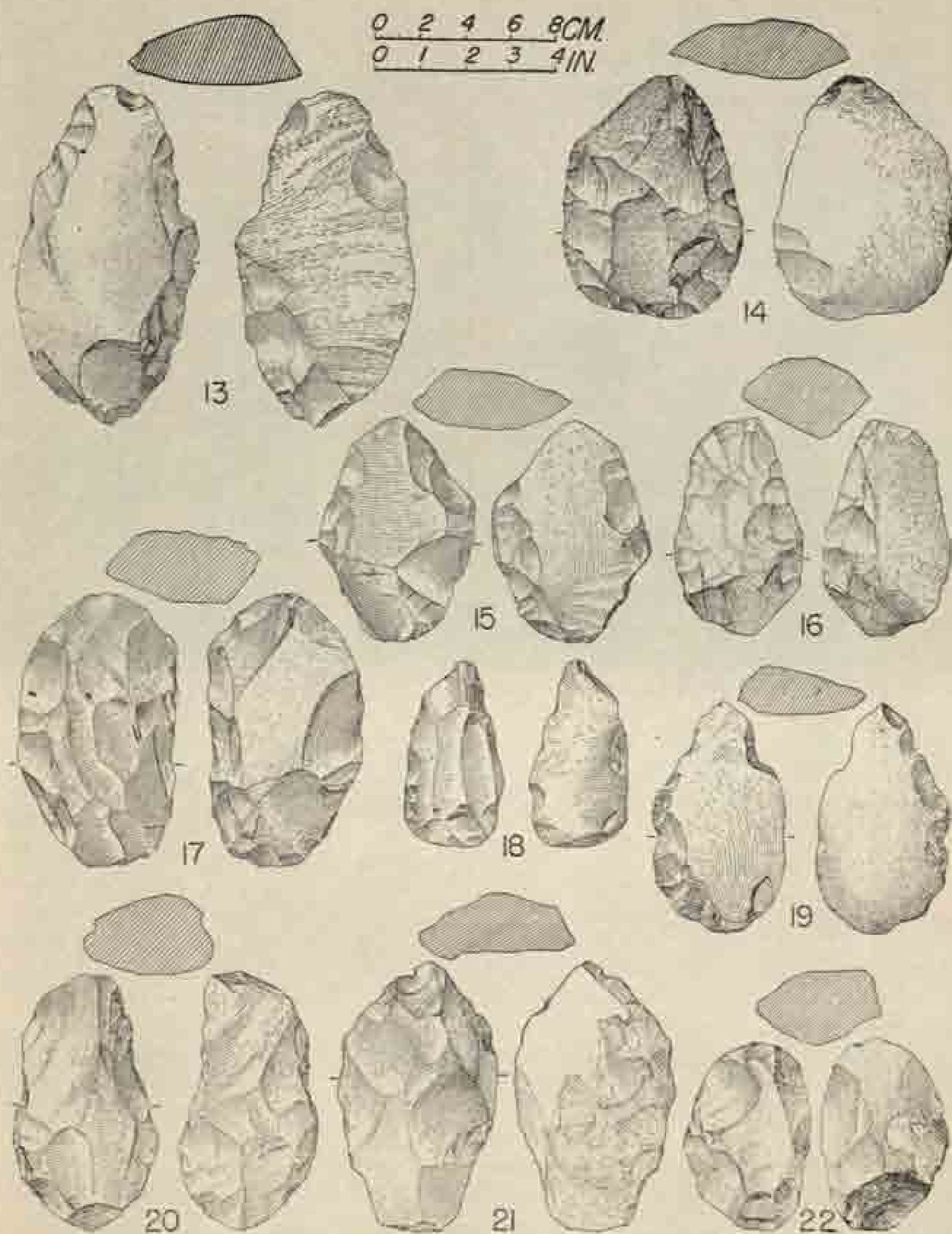


Fig. 22. Hand Axes. See p. 26

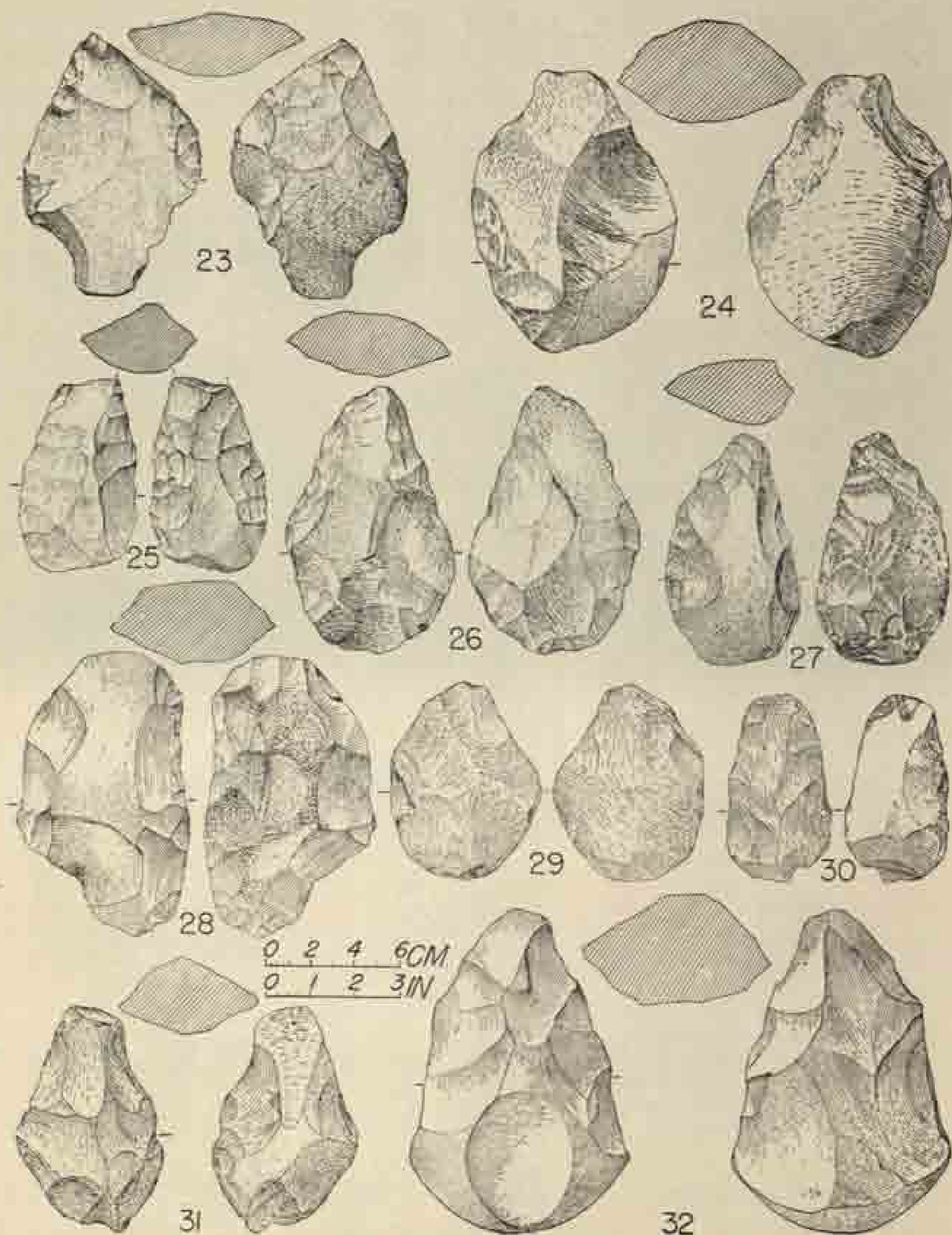


Fig. 23. Hand Axes. *See p. 26*

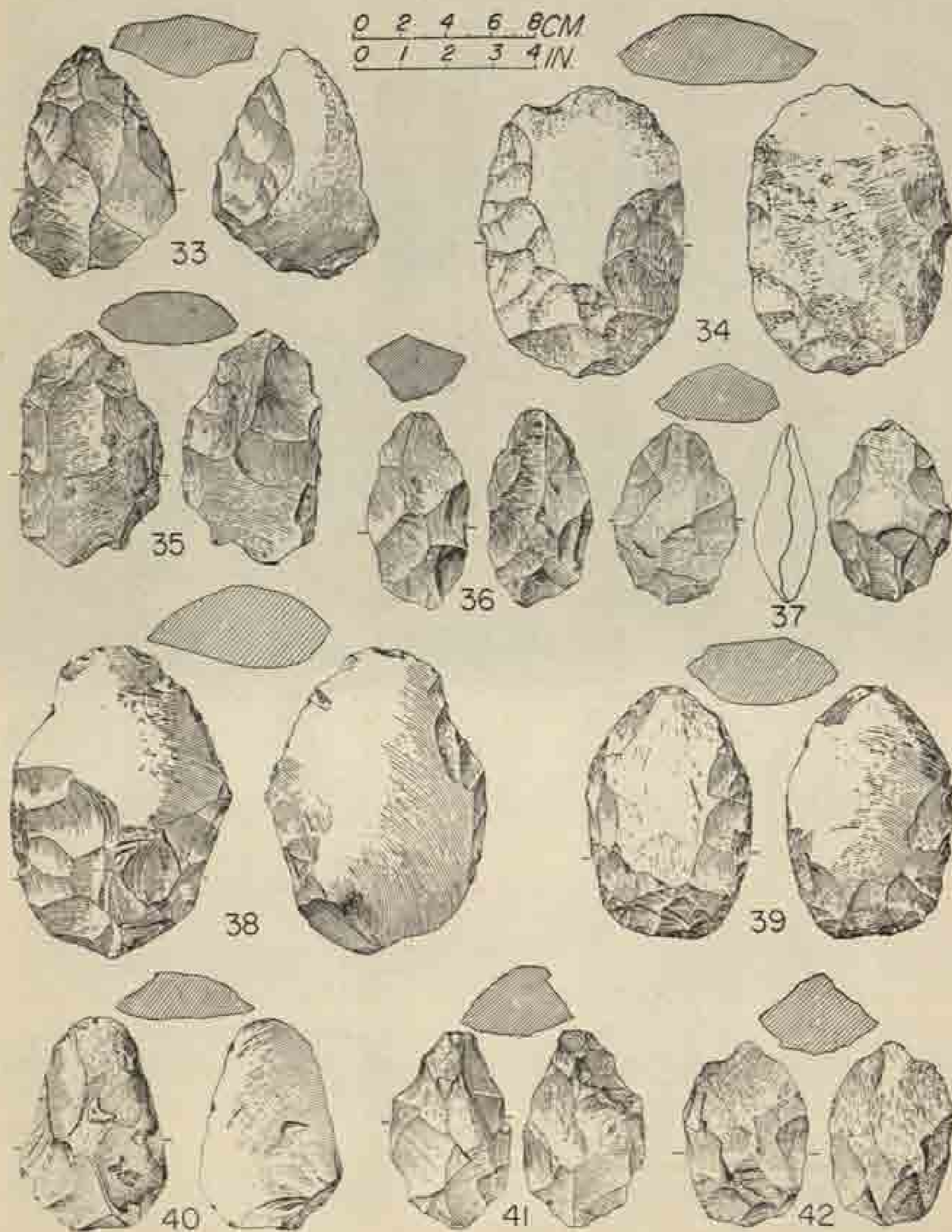


Fig. 24. Hand Axes. *See p. 26*

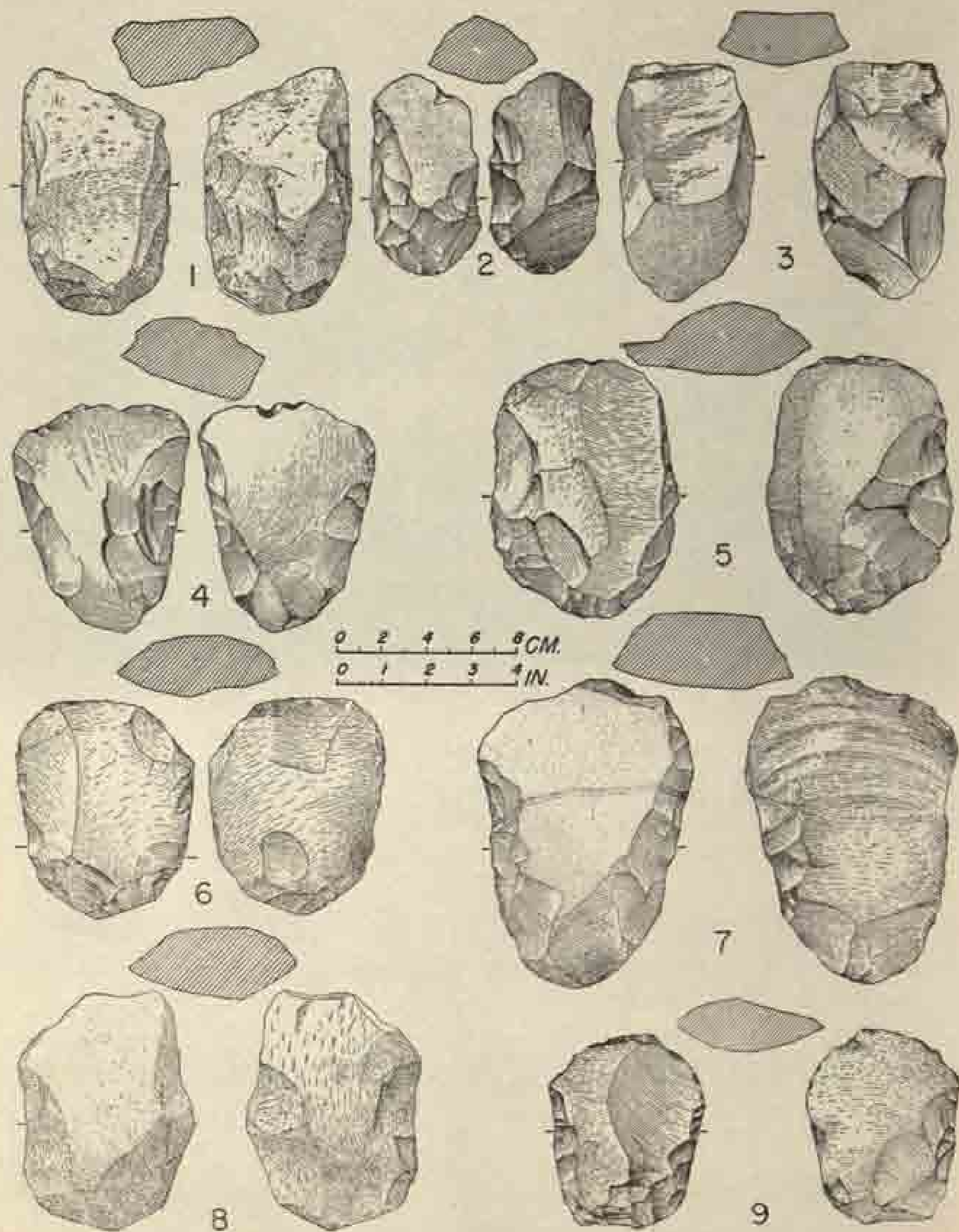


Fig. 25. Cleavers. See p. 30

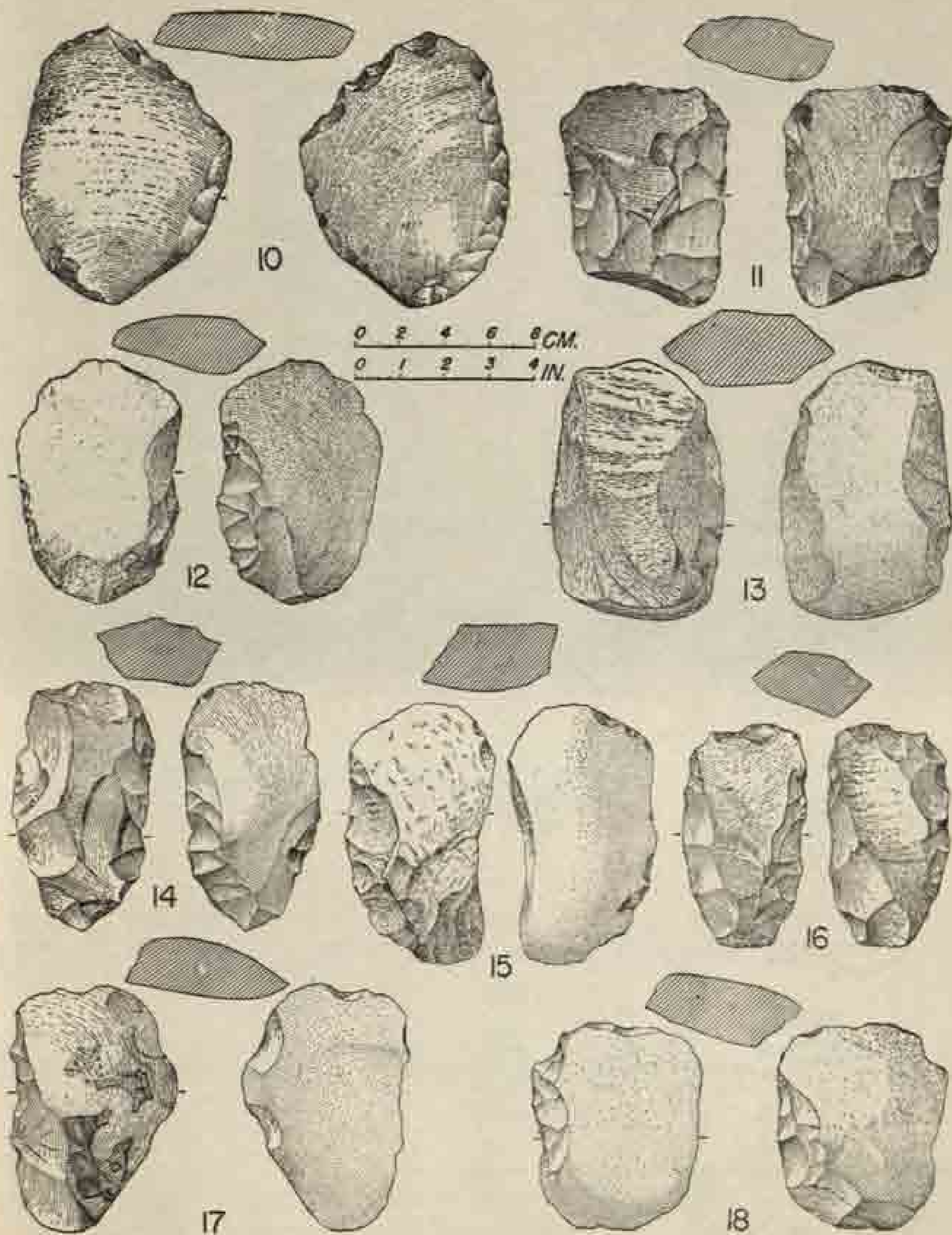


Fig. 26. Cleavers I. See p. 30

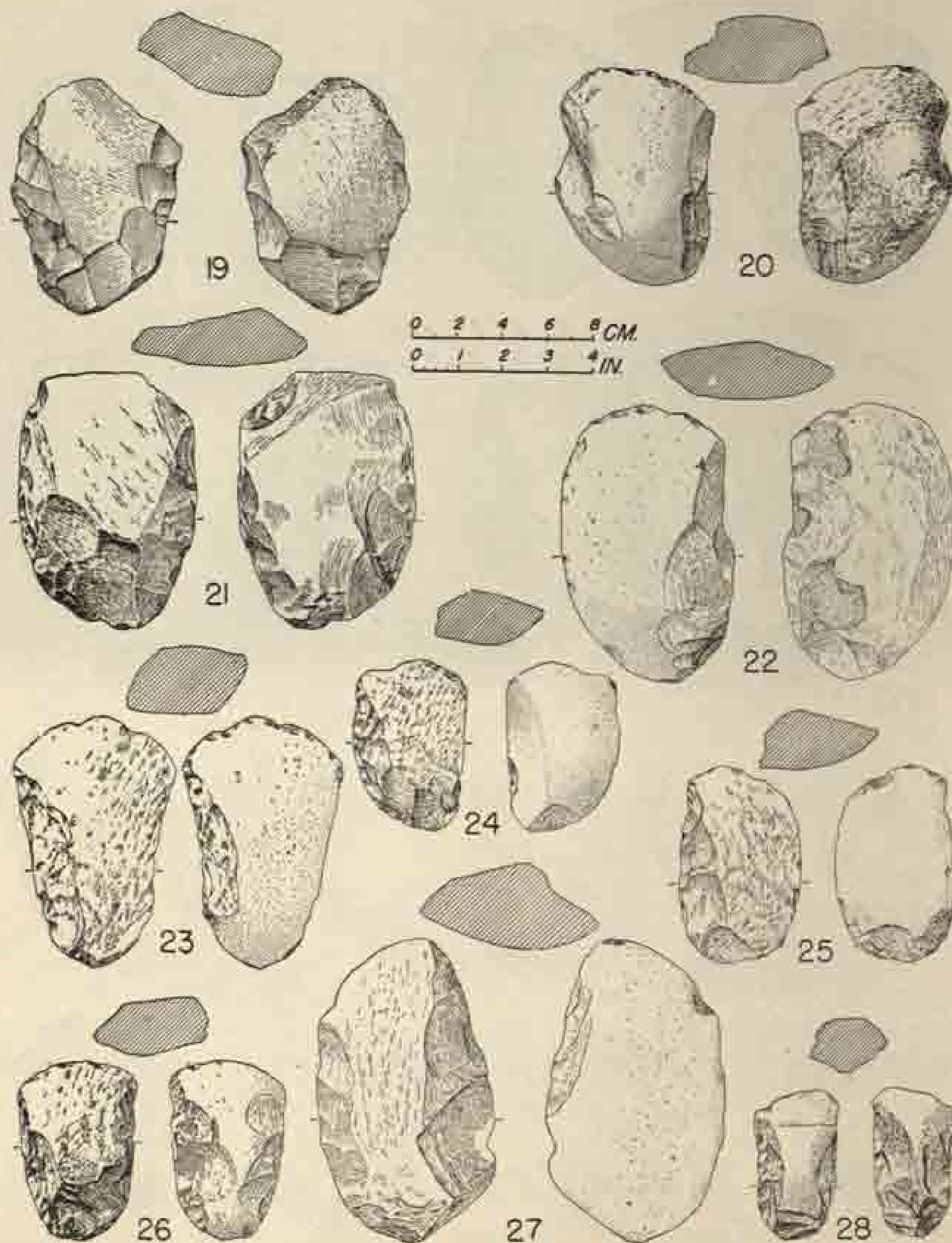


Fig. 27. Cleavers I. See p. 30

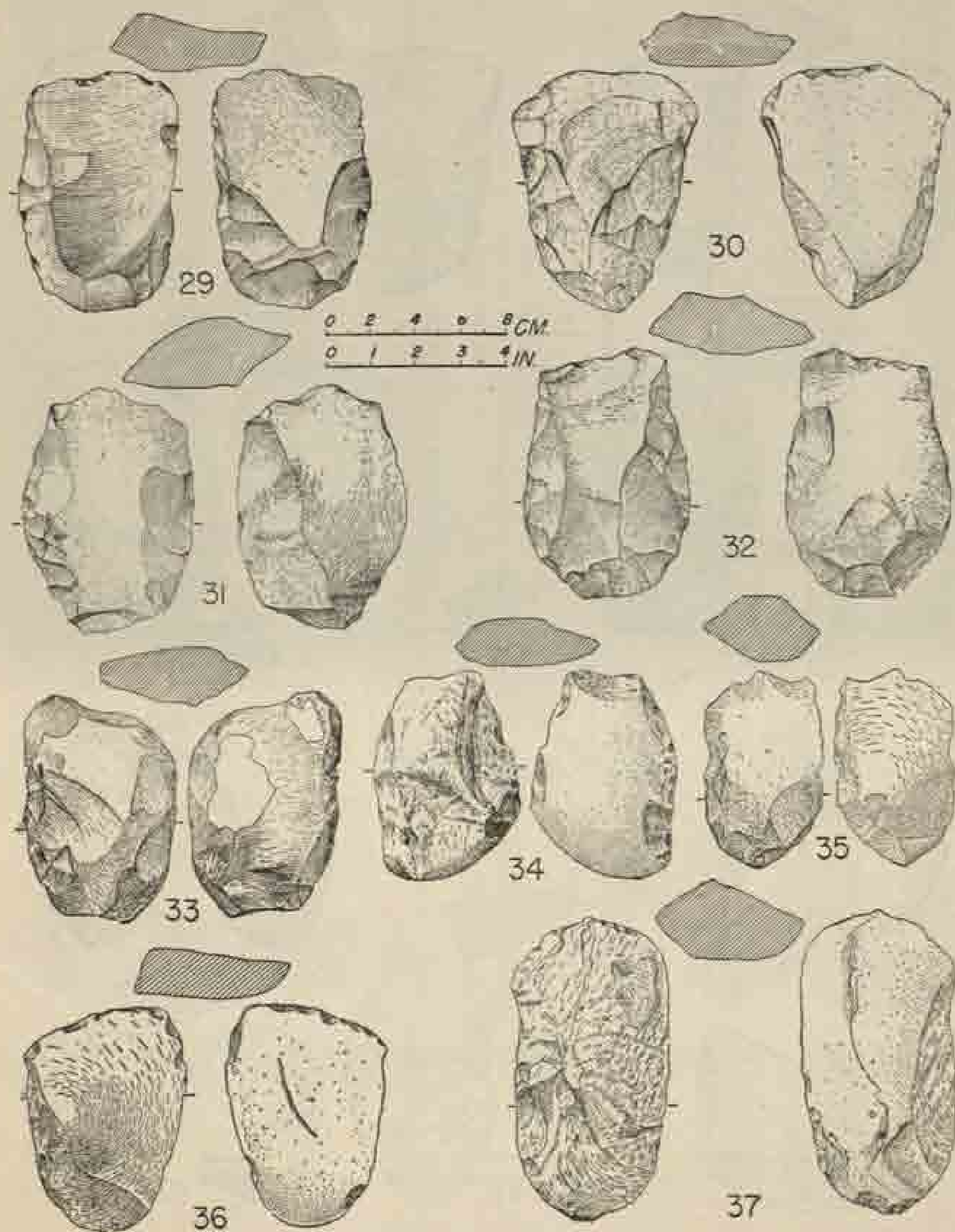


Fig. 28. Cleavers I. See p. 30

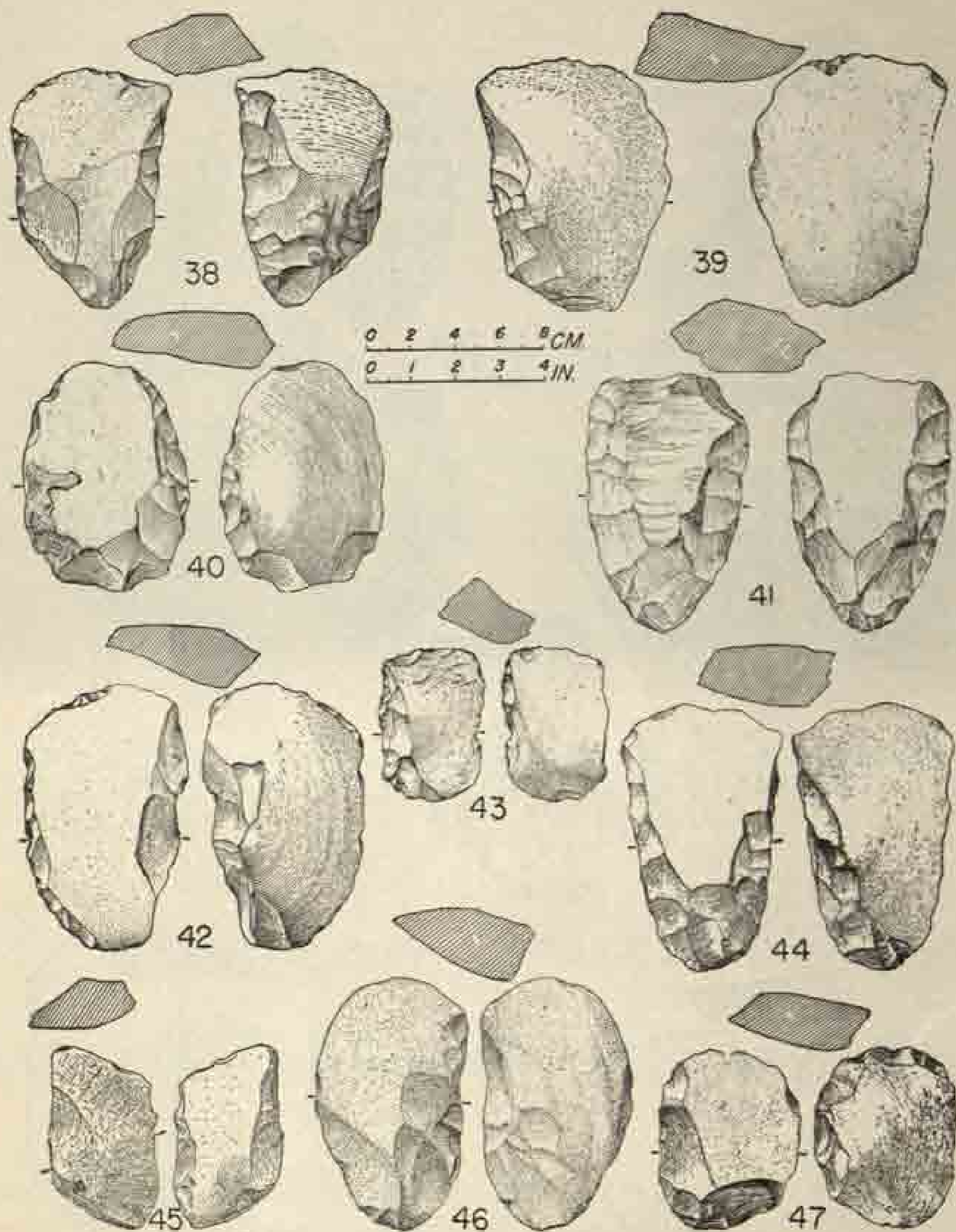


Fig. 29. Cleavers I. See p. 30

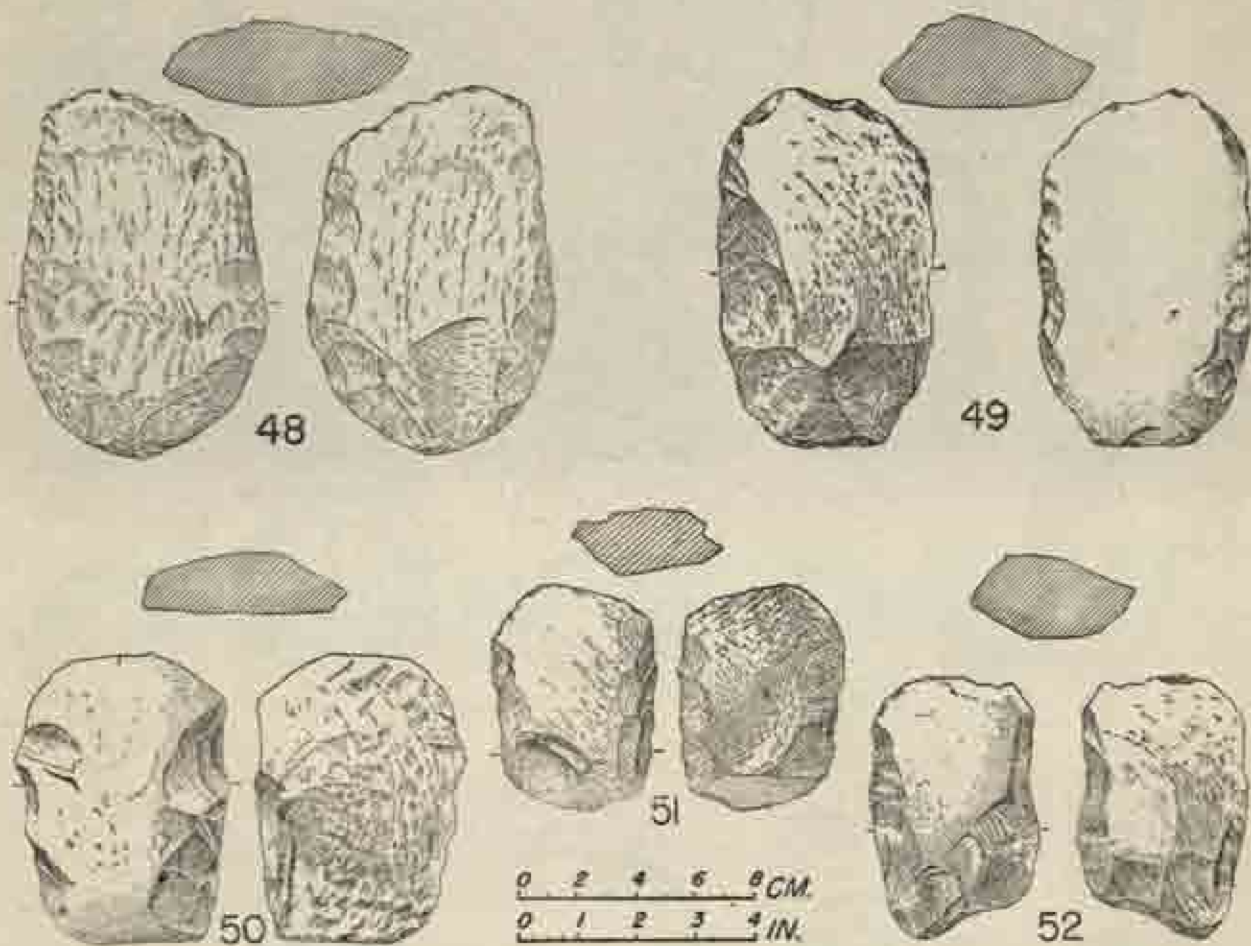


Fig. 30. Cleavers. See p. 30

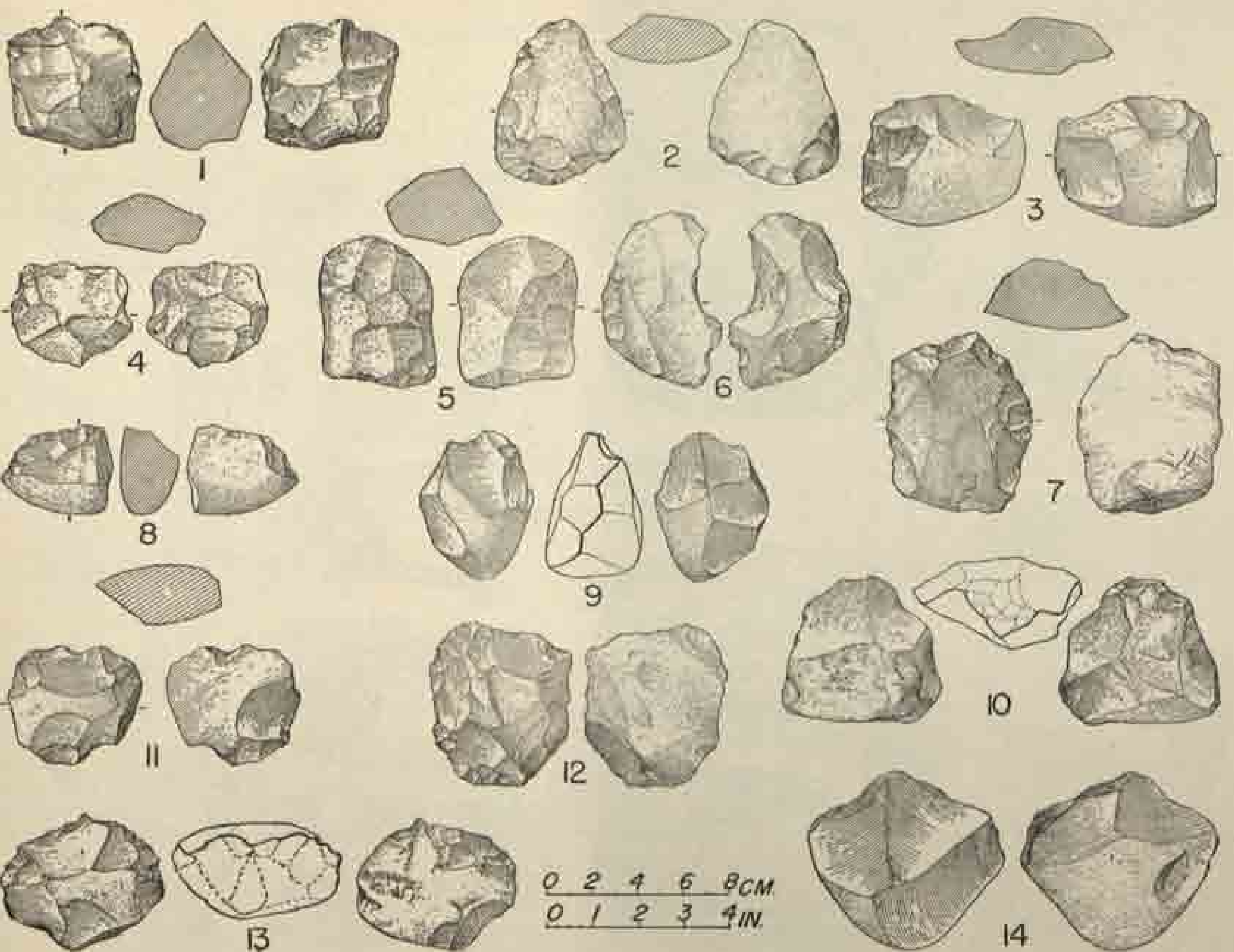


Fig. 31. Choppers and Scrapers. See p. 35

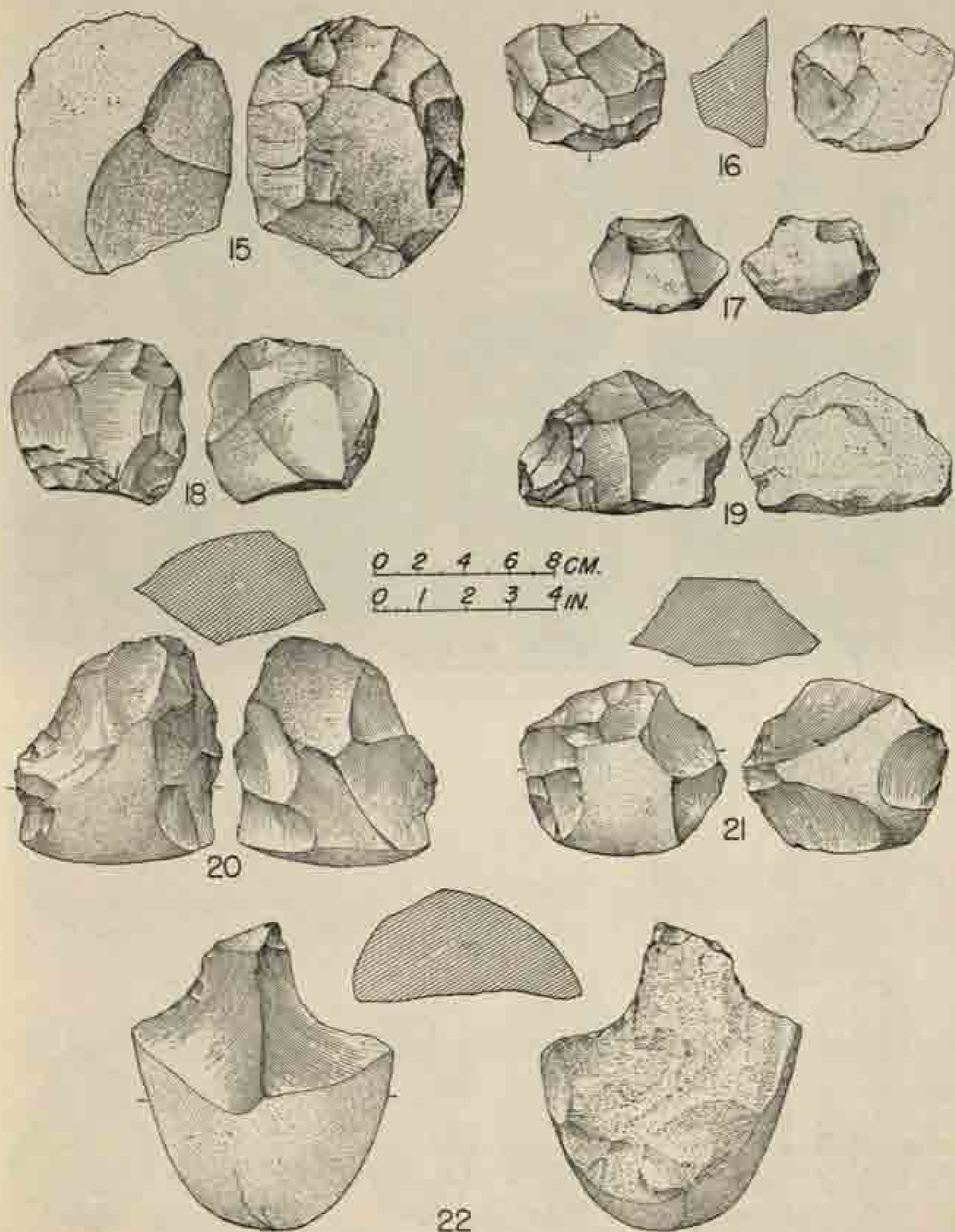


Fig. 32. Choppers and Scrapers See p. 35

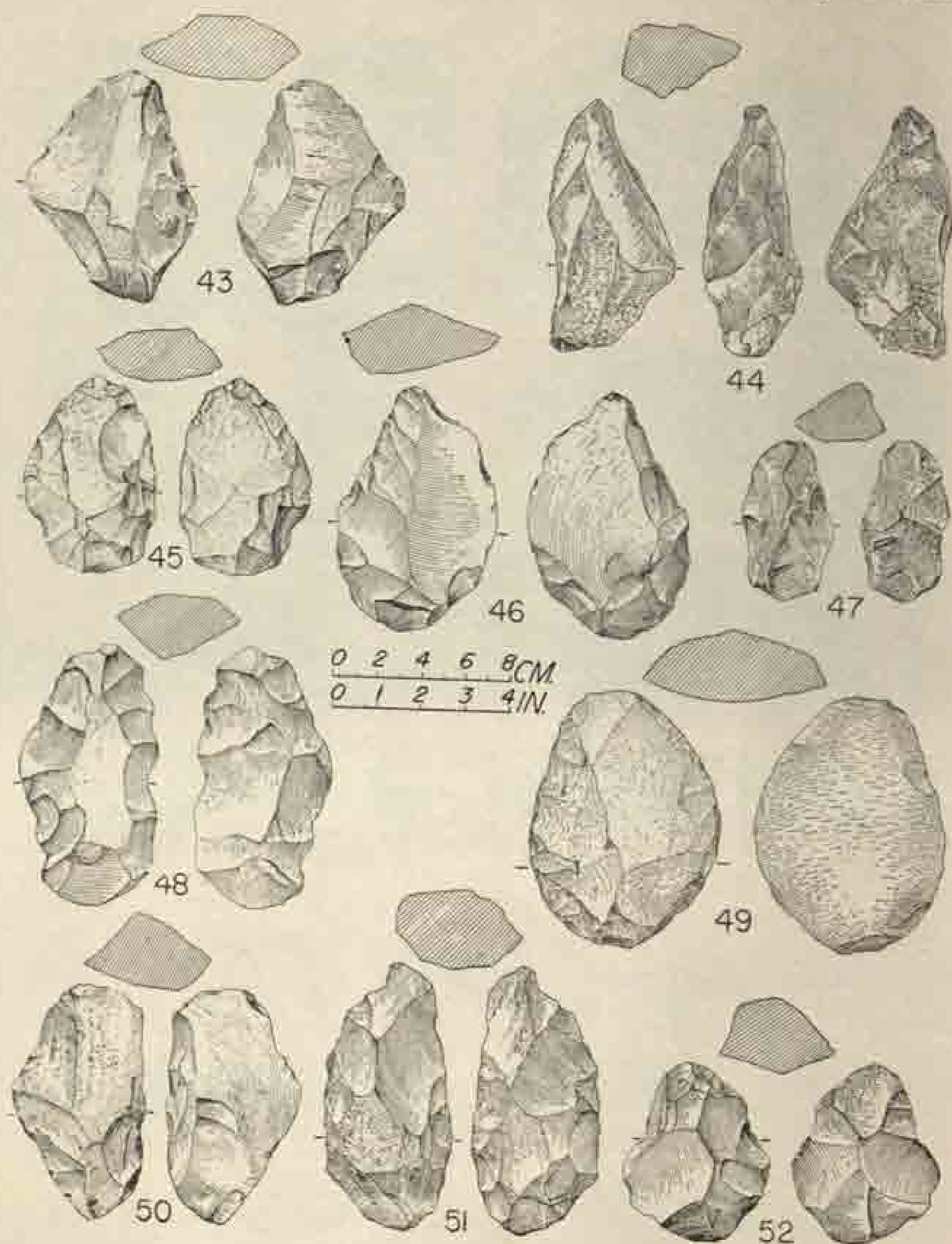


Fig. 33. Hand Axes. See p. 40

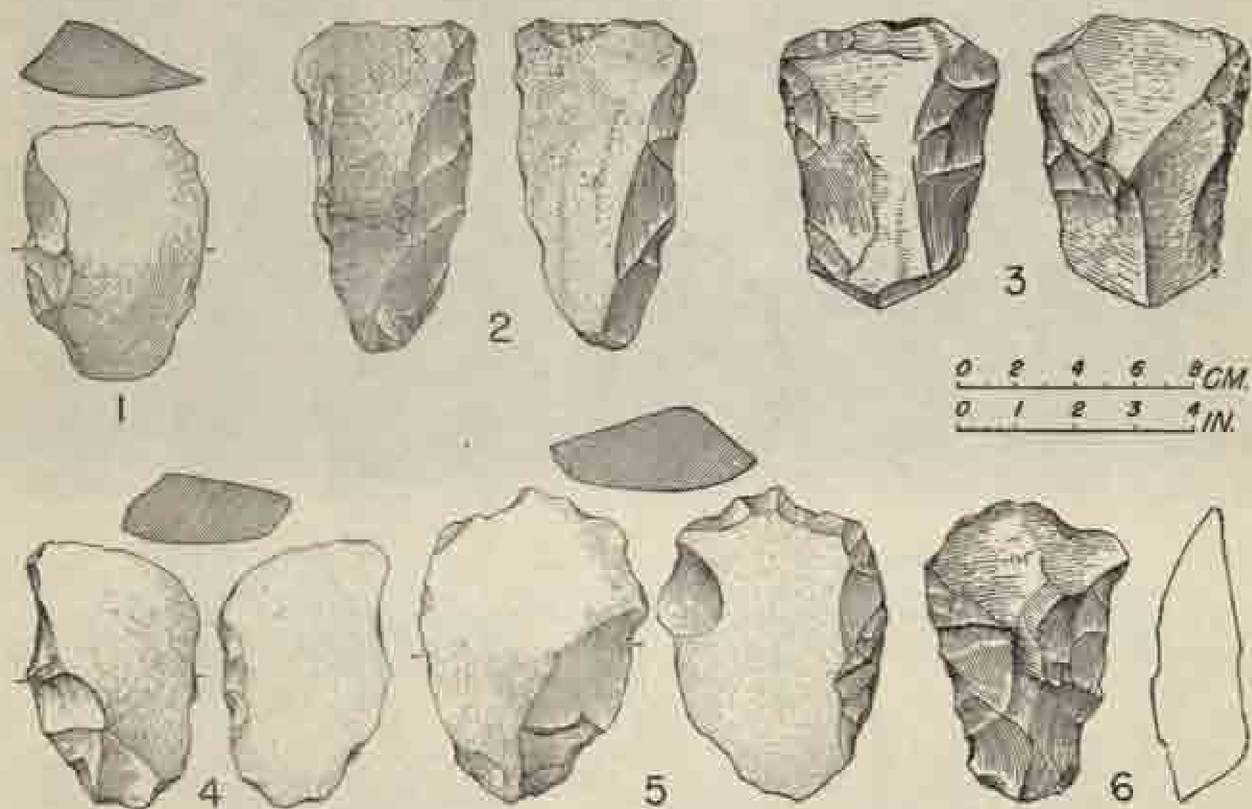
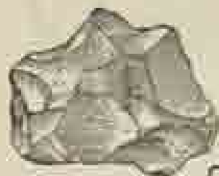


Fig. 34. Cleavers II. *See p. 40*

















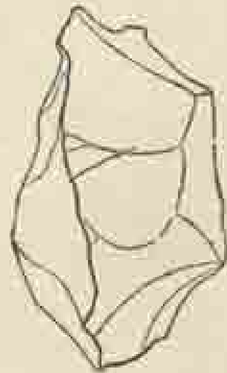










Fig. 35. Chopers and Scrapers. *See p. 49*

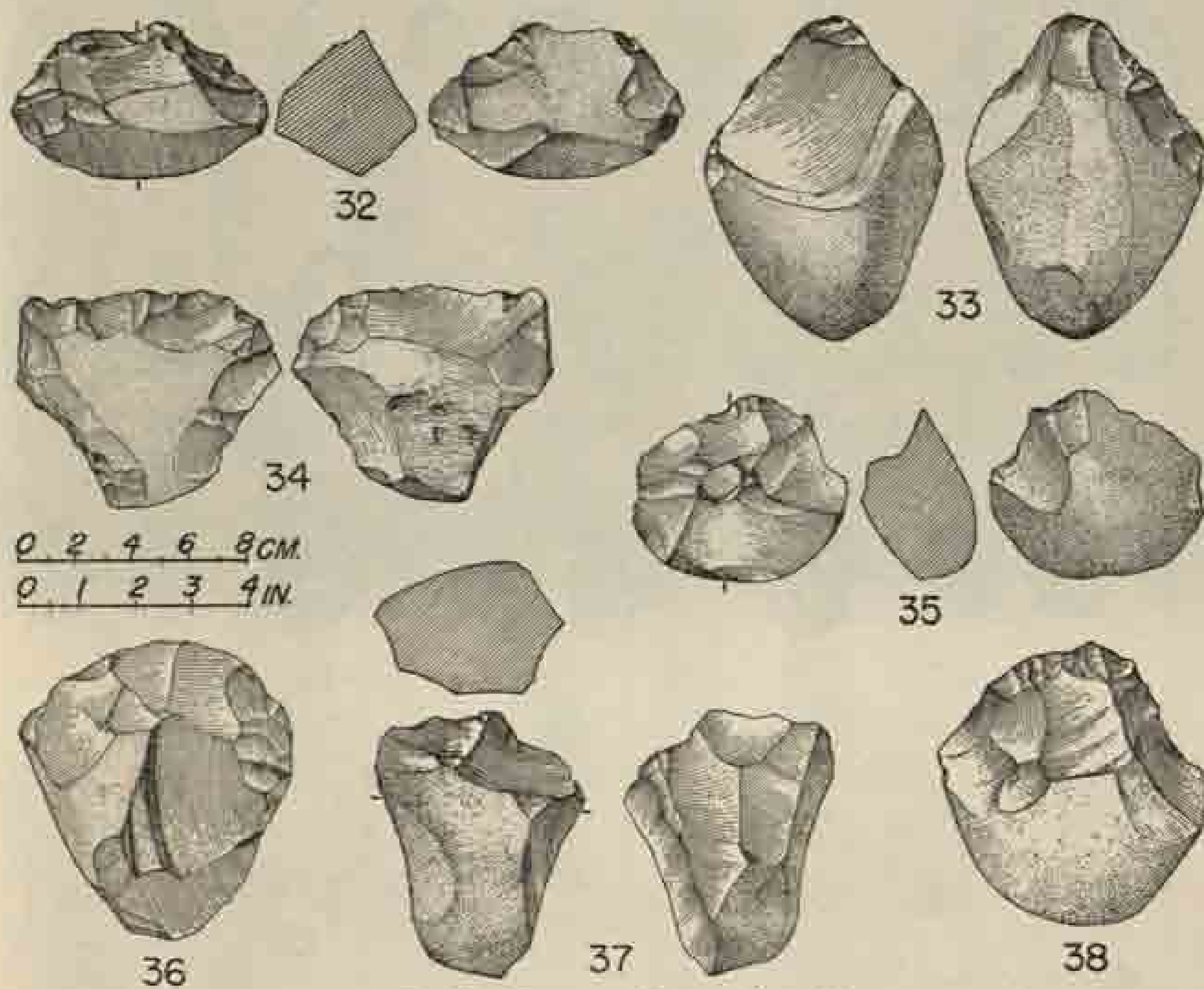


Fig. 36. Choppers and Scrapers. *See p. 40*

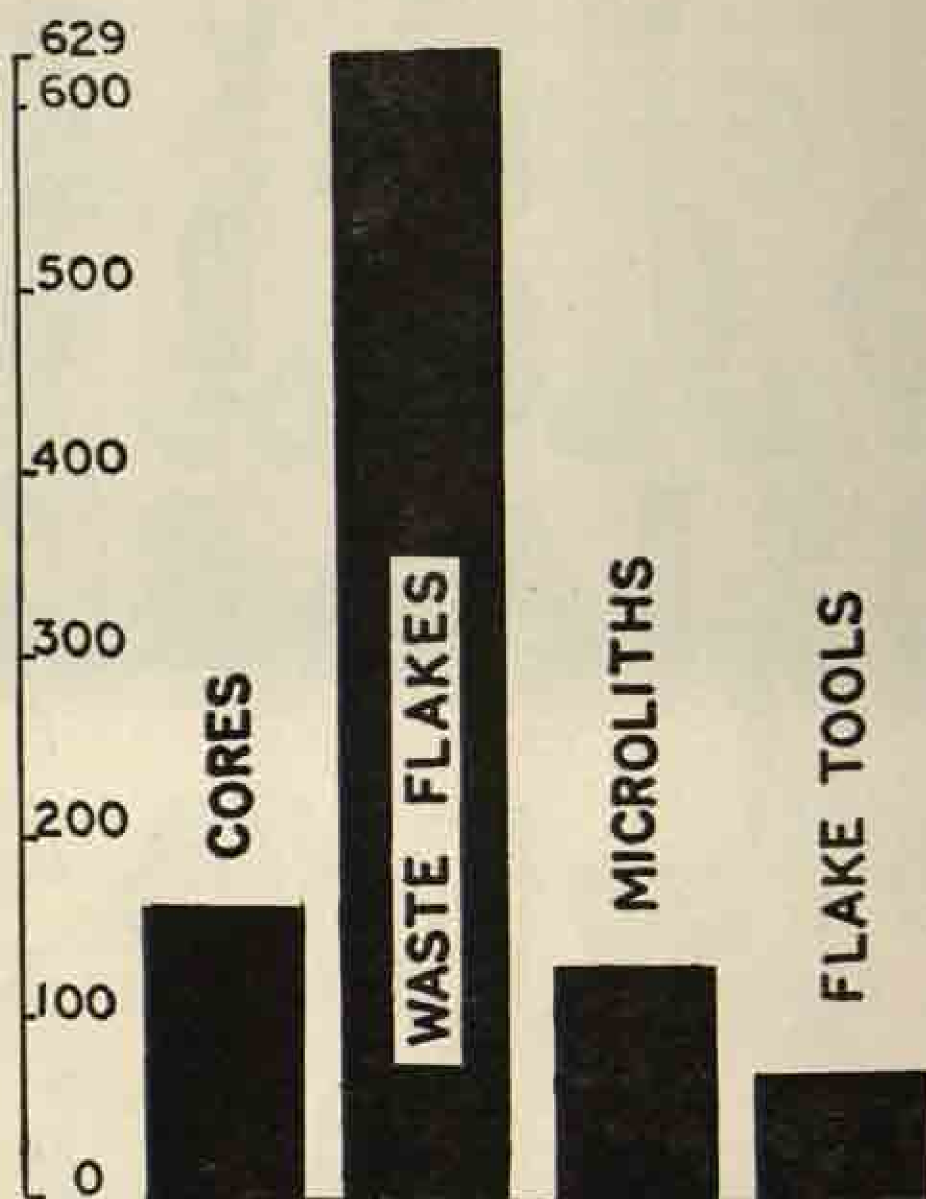


Fig. 39. Frequency distribution of microlithic products, Site No. 45-A. *See p. 50*

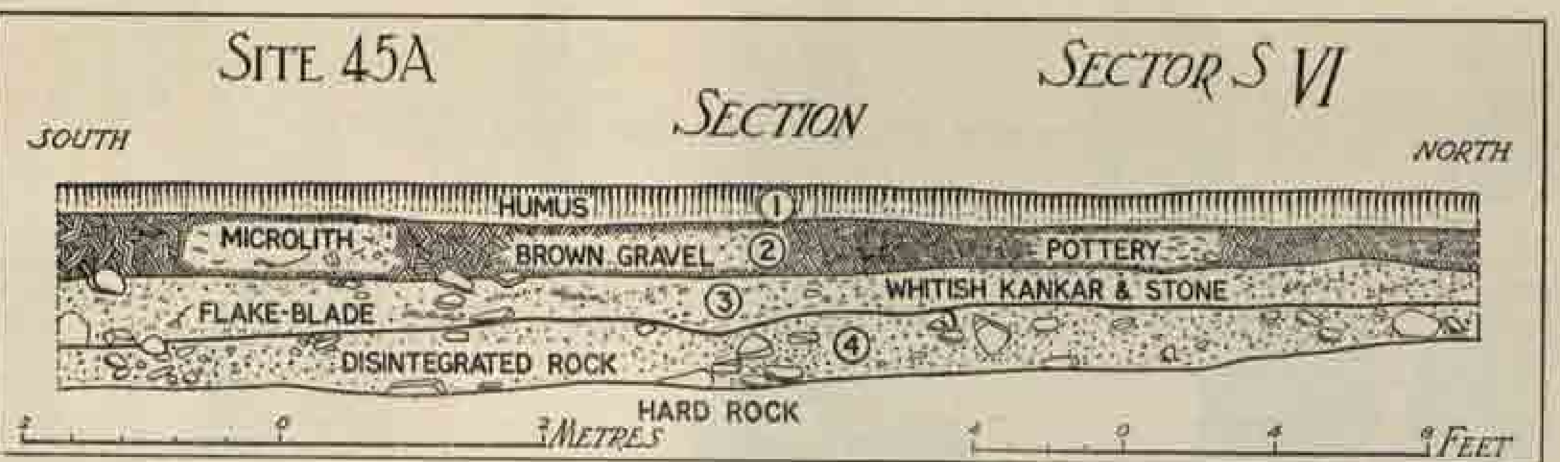


Fig. 40. Typical Section. See p. 59

Fig. 41 Microliths; Site No. 45A. See pp. 53 to 55

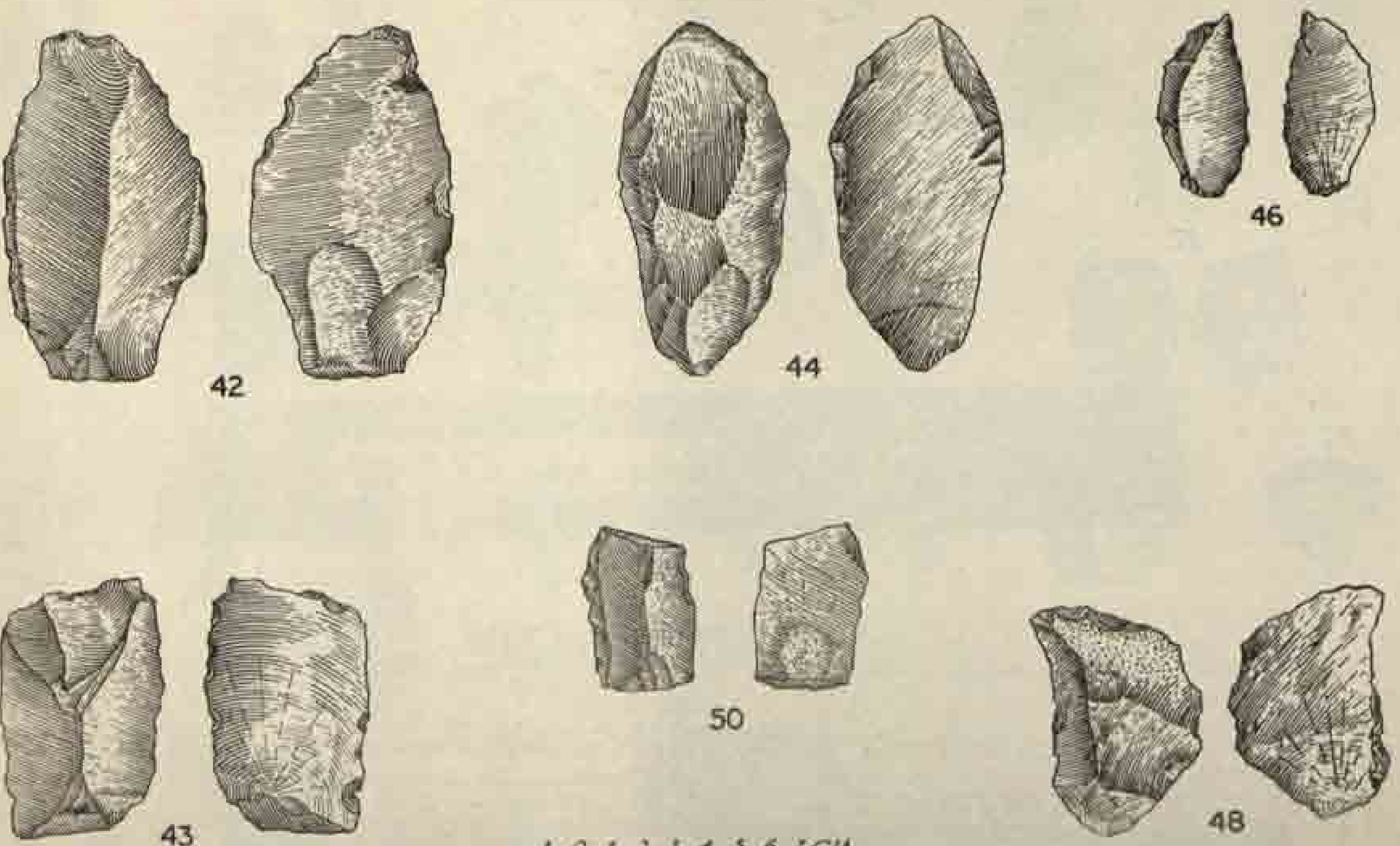


Fig. 42. Flakes: Site No. 45A. See pp. 55 and 56.

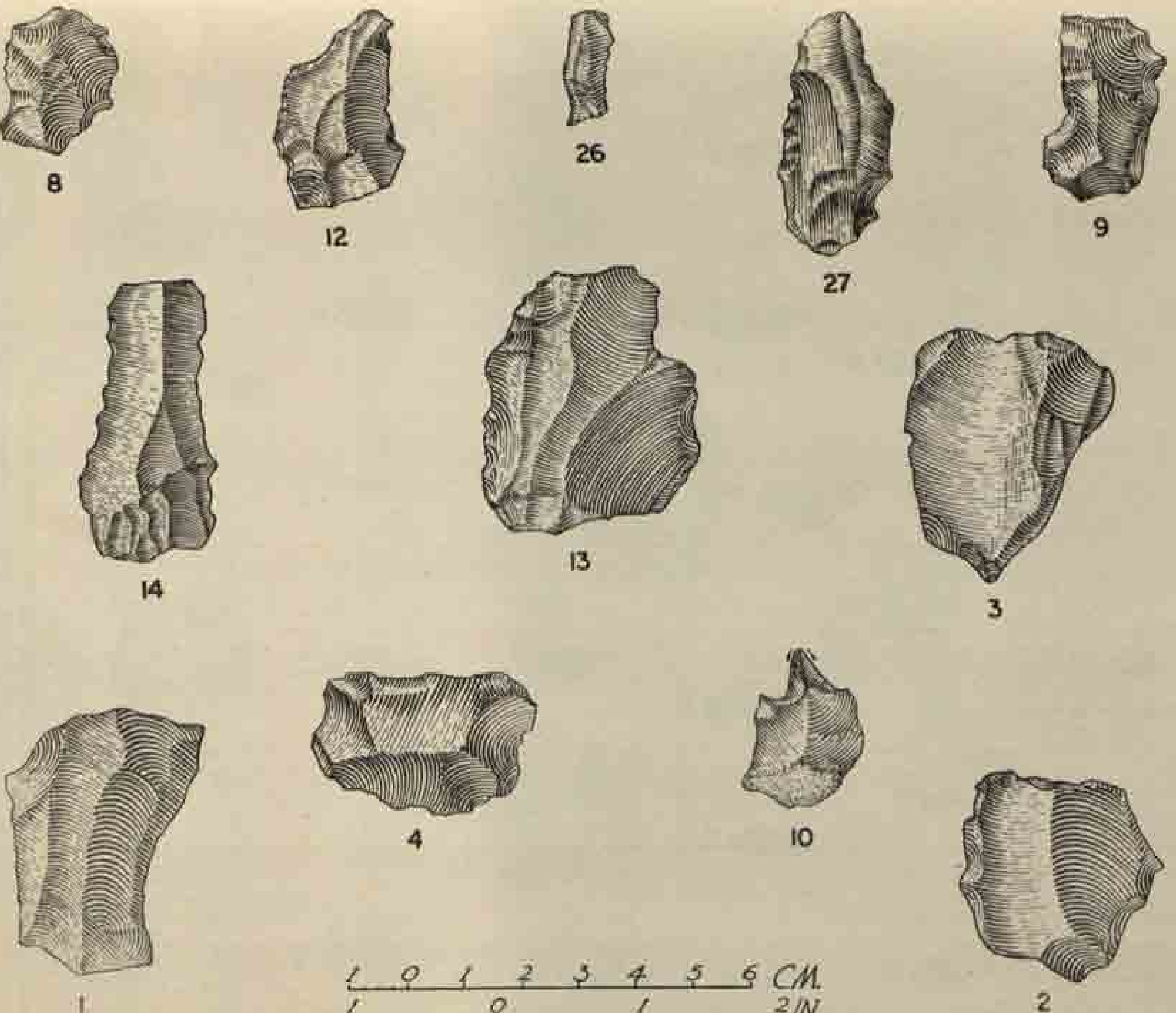


Fig. 43. Flakes; Site No. 53. See pp. 58-60

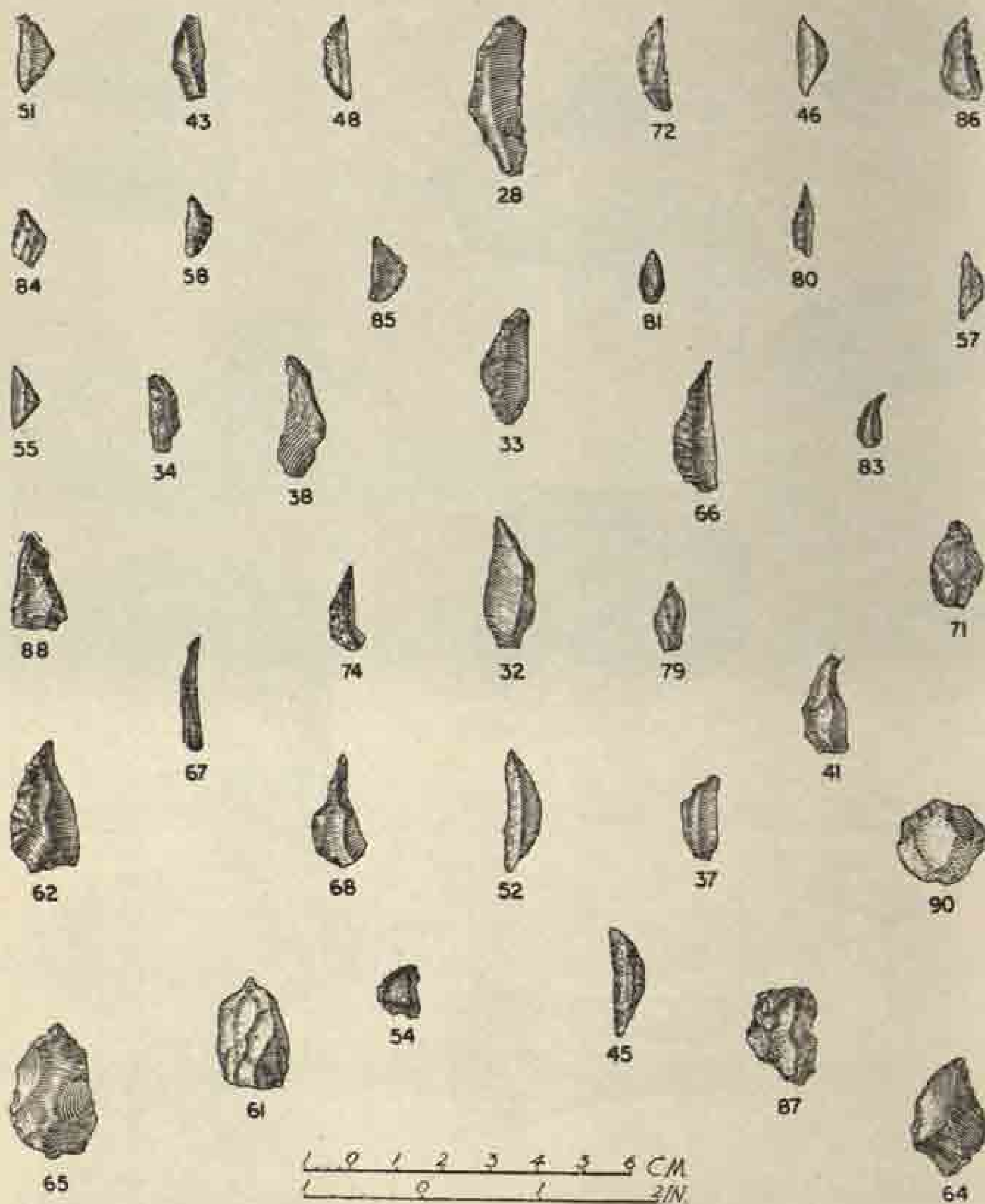


Fig. 44. Microlithic samples, Site No. 53. *See pp. 60–64*

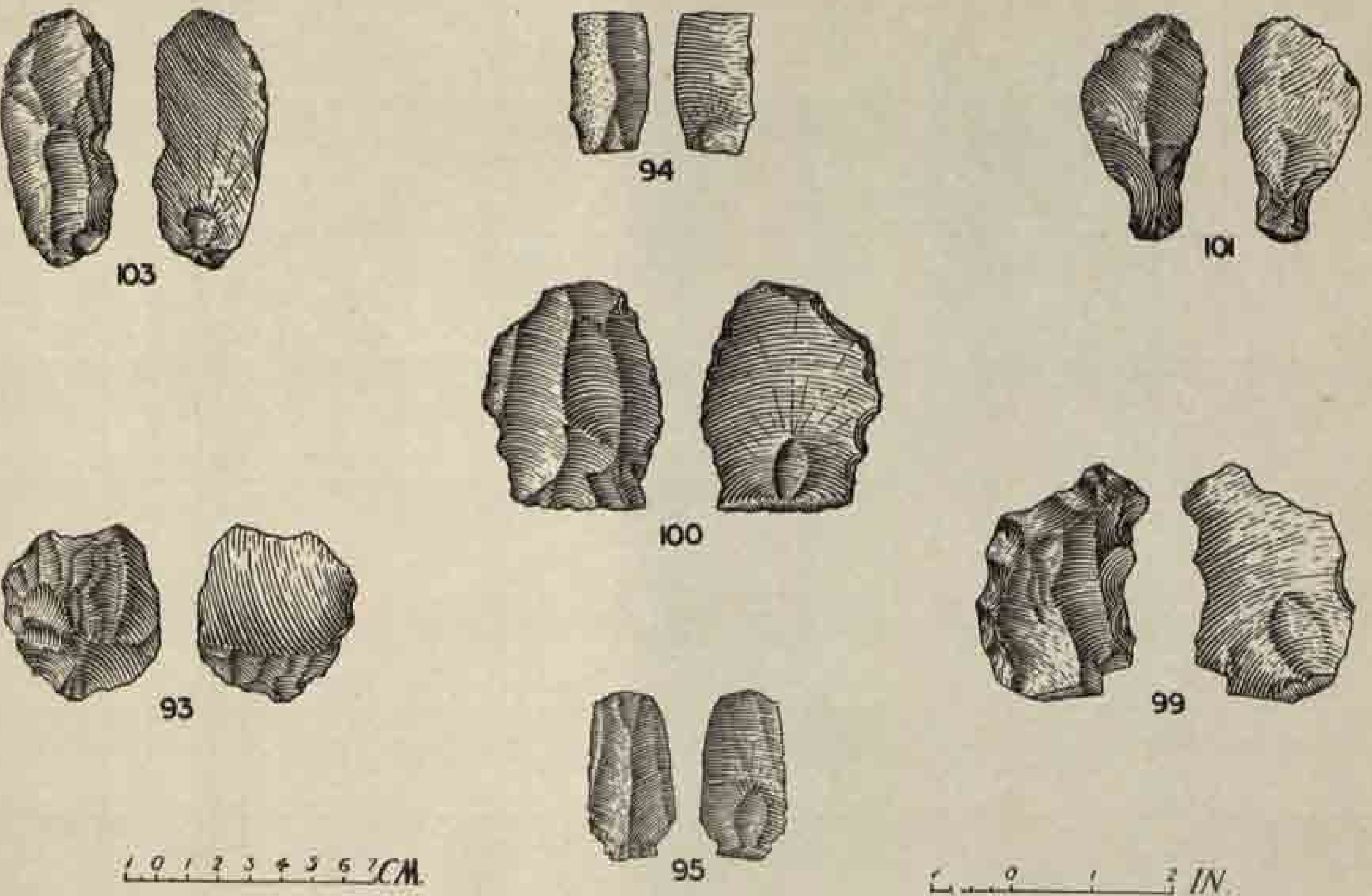


Fig. 45. Microlithic samples, Site No. 53. *See p. 65*

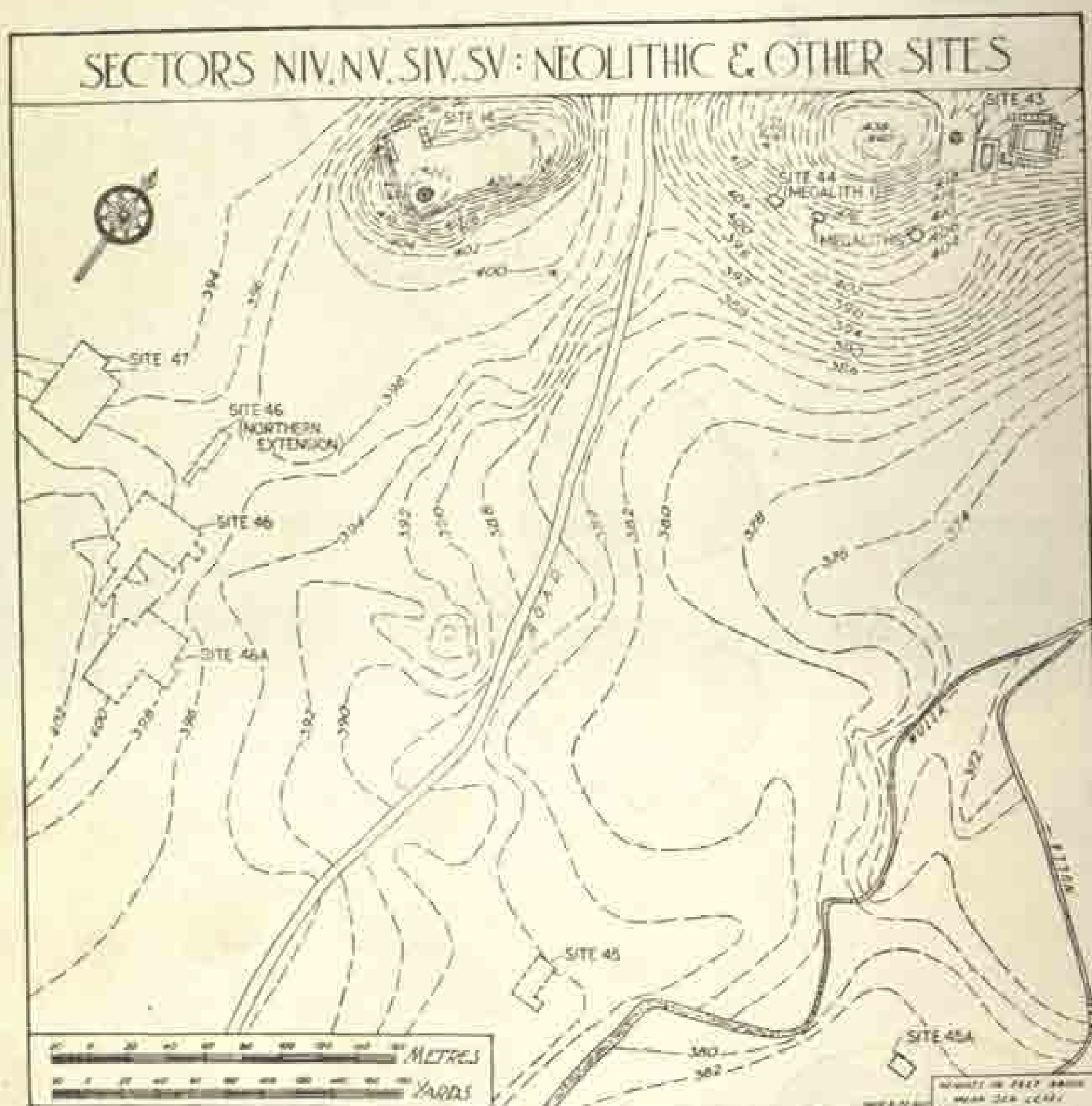


Fig. 46. Contour map showing the distribution of neolithic sites. See p. 72

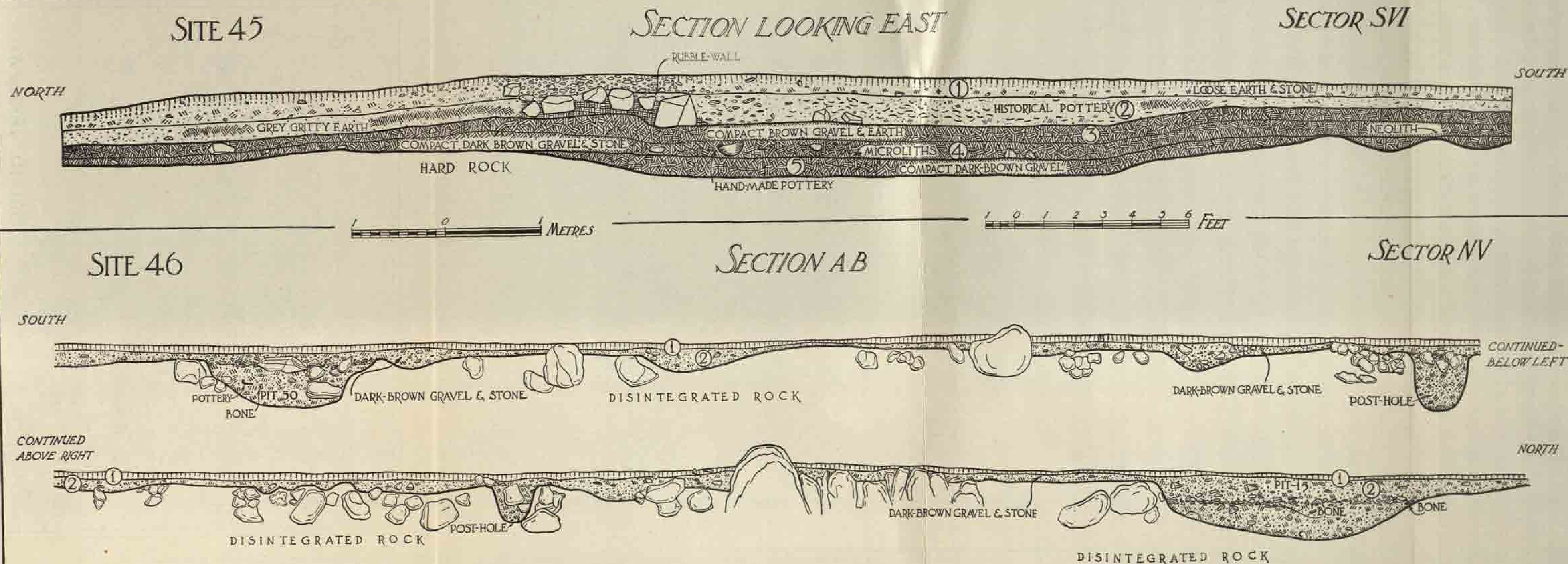


Fig. 47. Typical Sections, Site Nos. 45 and 46. See p. 85

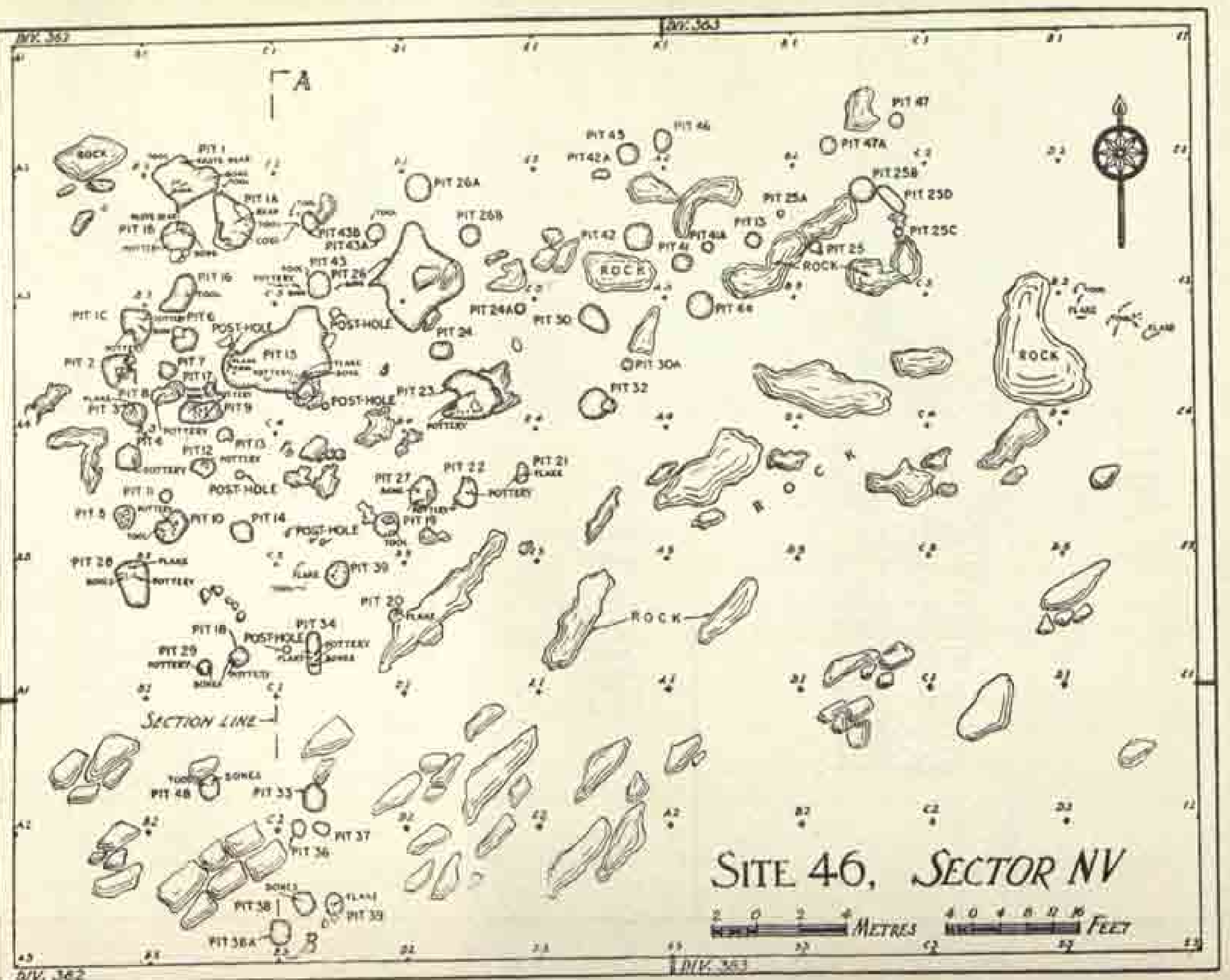


Fig. 48. Plan showing the distribution of pits; Site No. 46. *See p. 86*

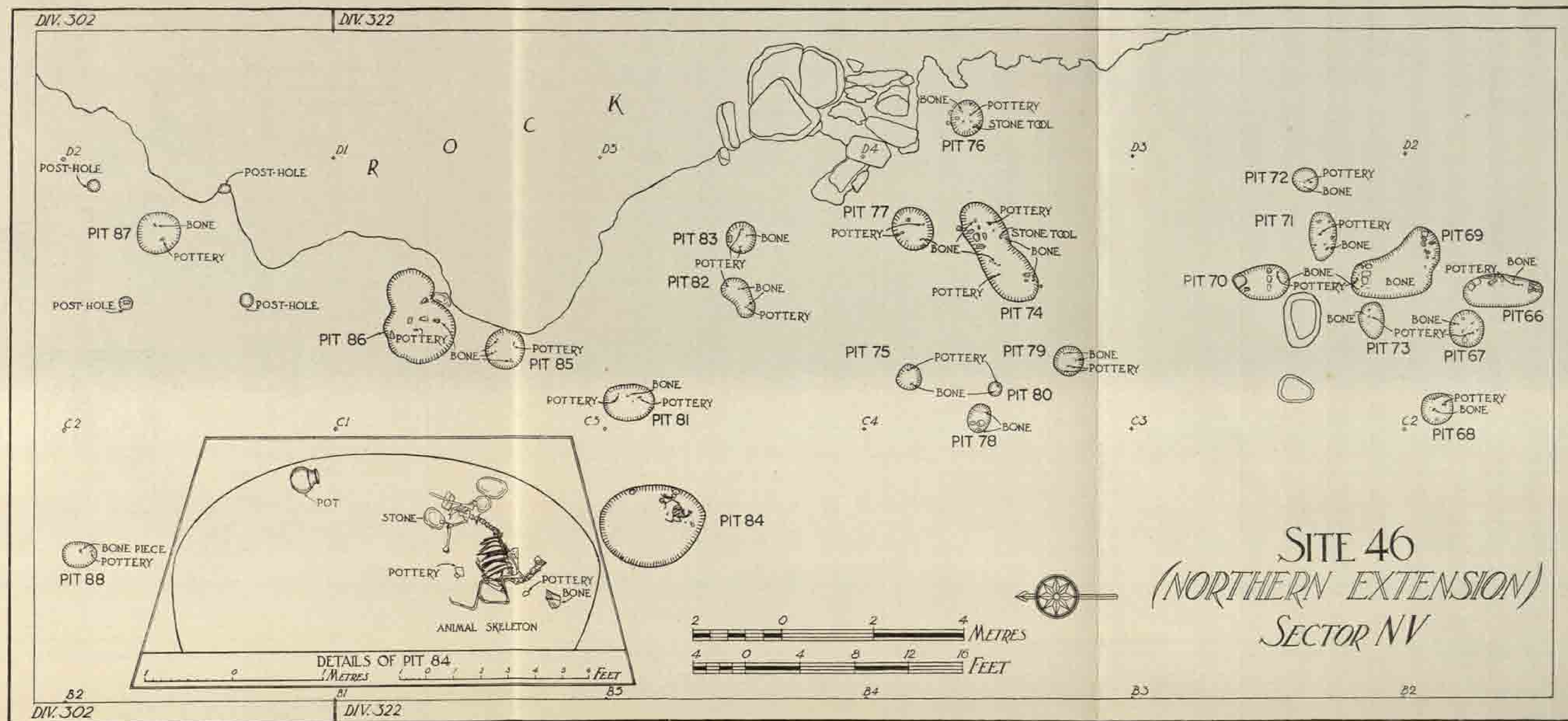


Fig. 49. Plan showing the distribution of pits; Northern Extension; Site No. 46. See p. 91

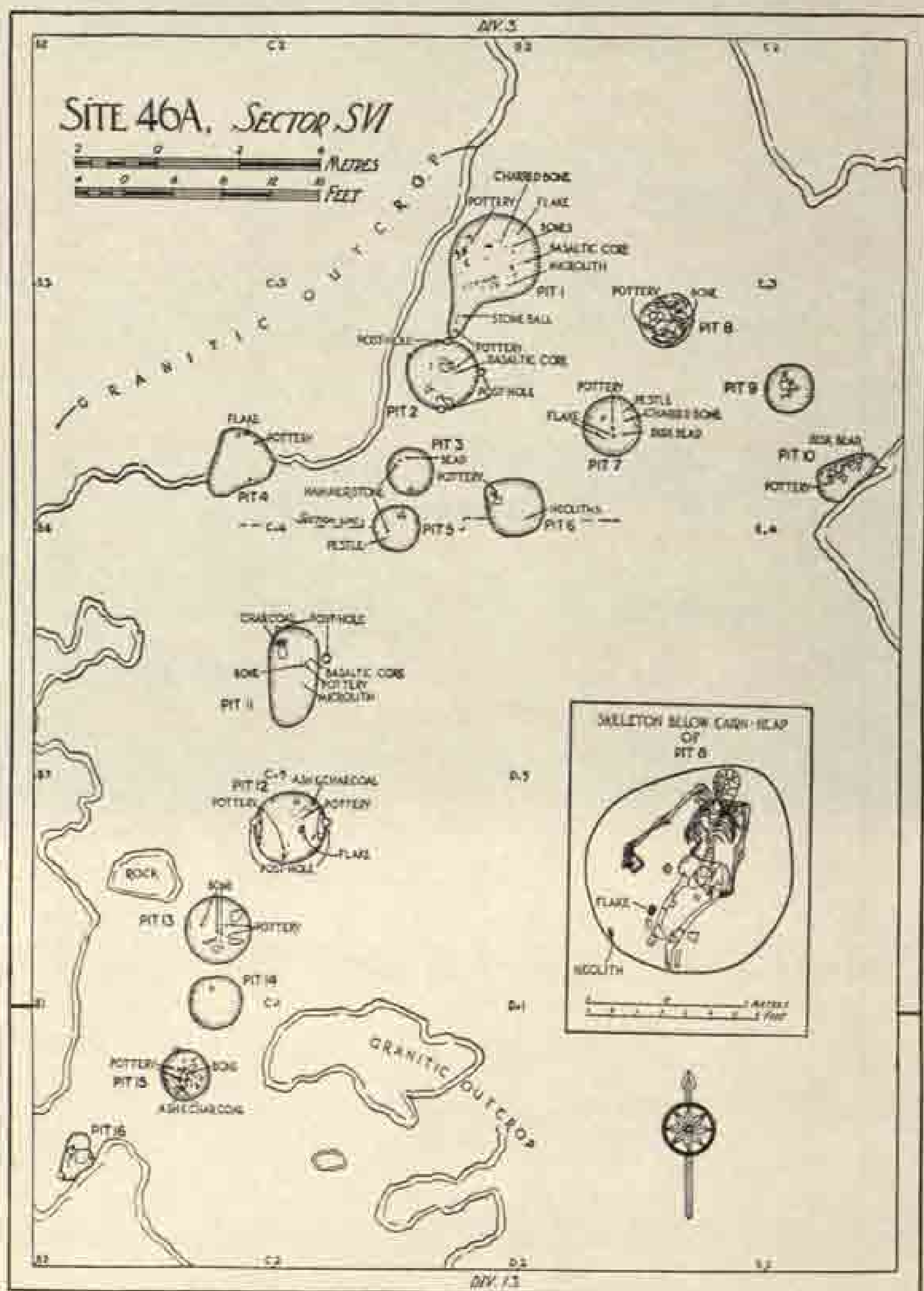


Fig. 50. Plan showing the distribution of pits; Site No. 46A. *See p. 92*

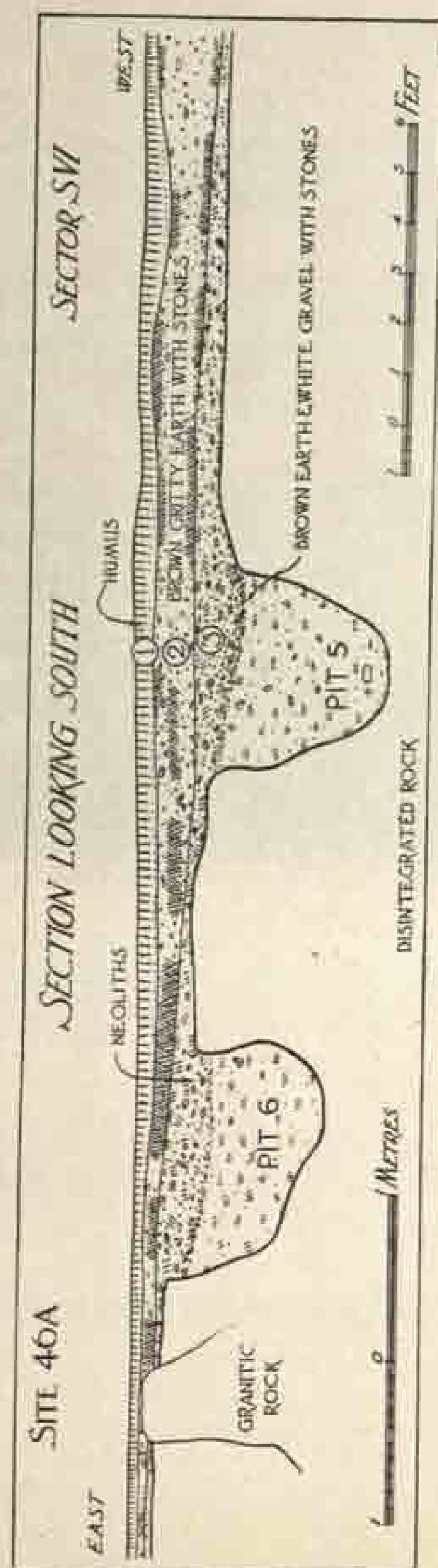


Fig. 51 Section showing pit nos. 6 and 5; Site no. 46A. *See p. 92*

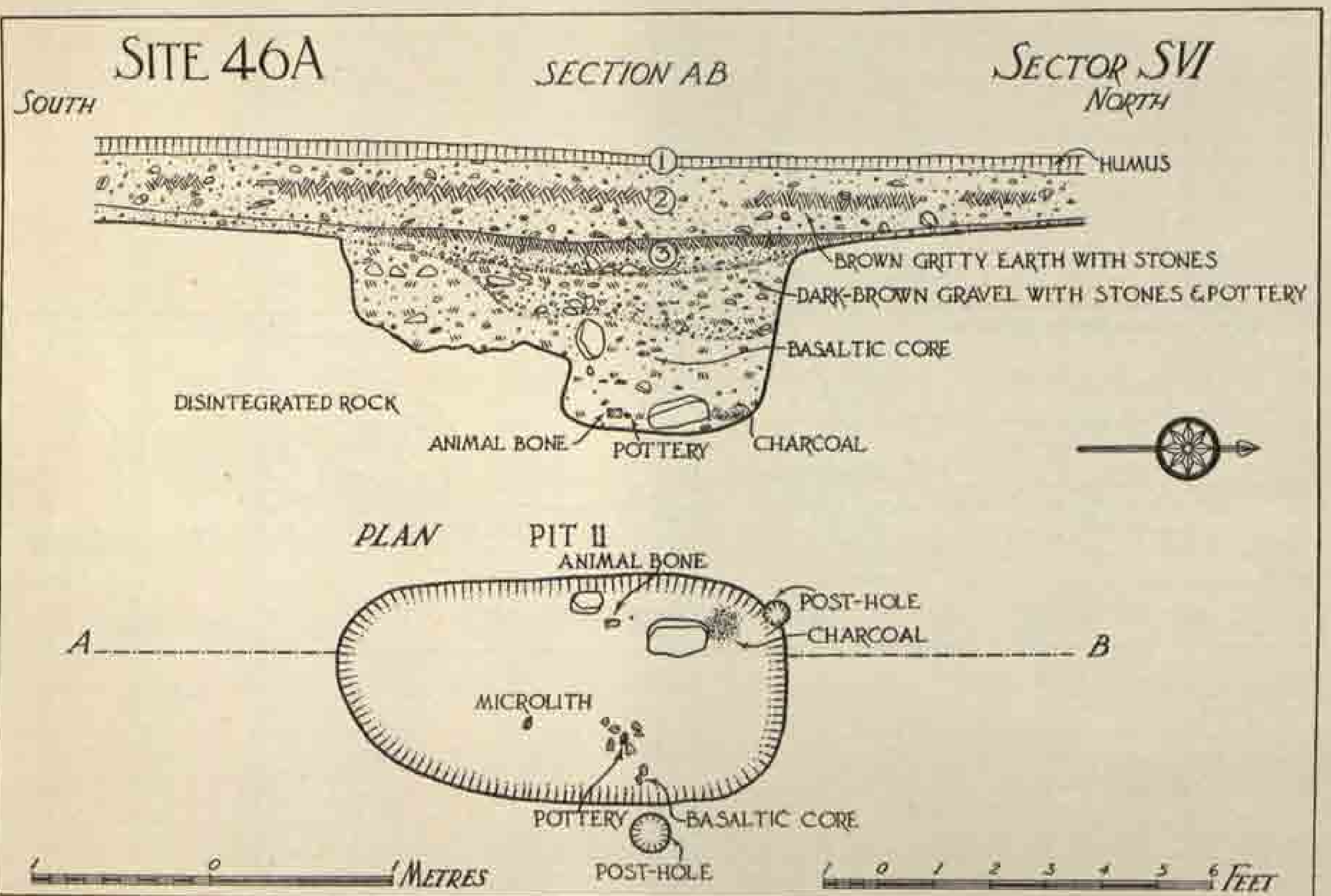


Fig. 32. Section and plan of pit No. 11, Site No. 46A. See p. 93

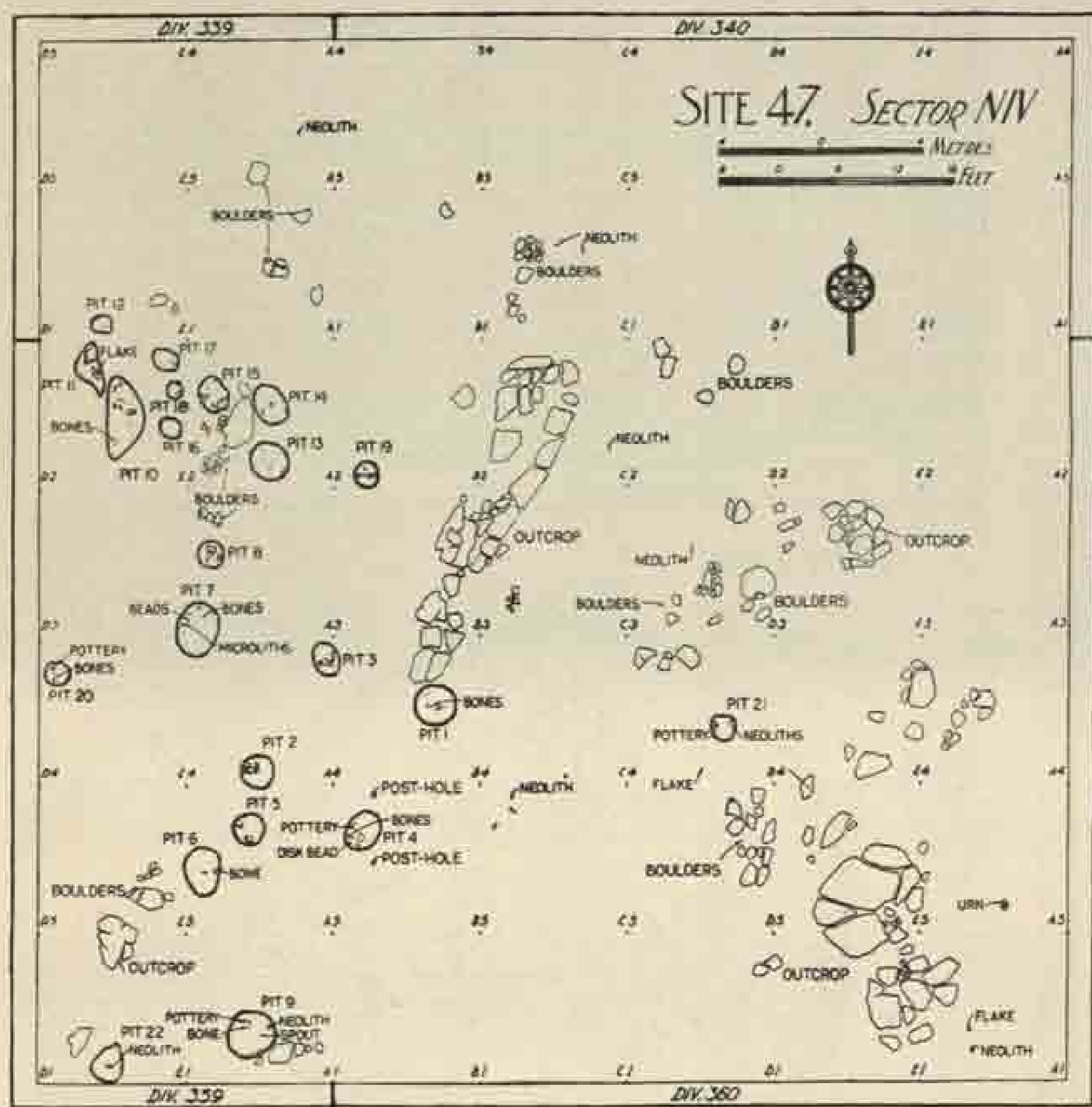
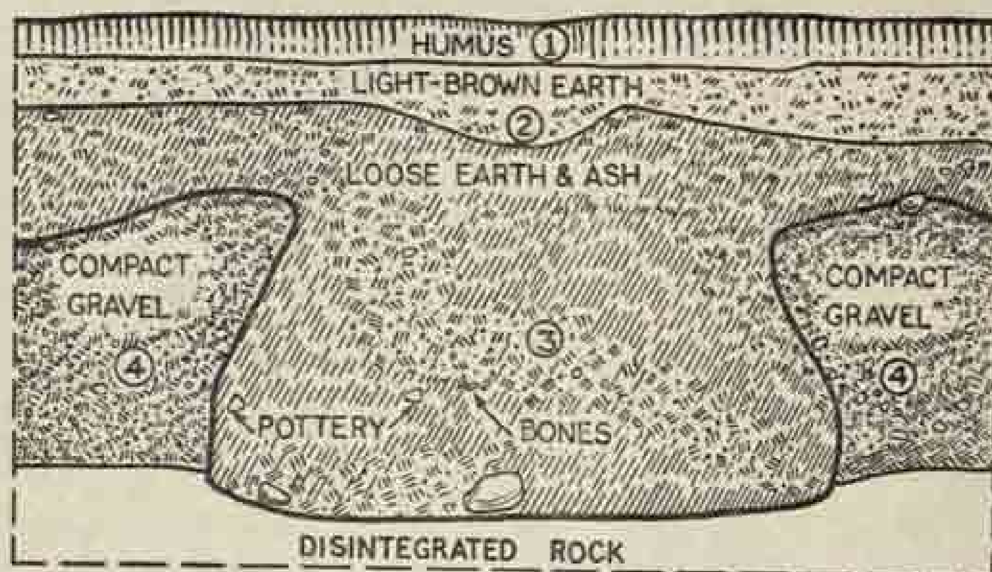


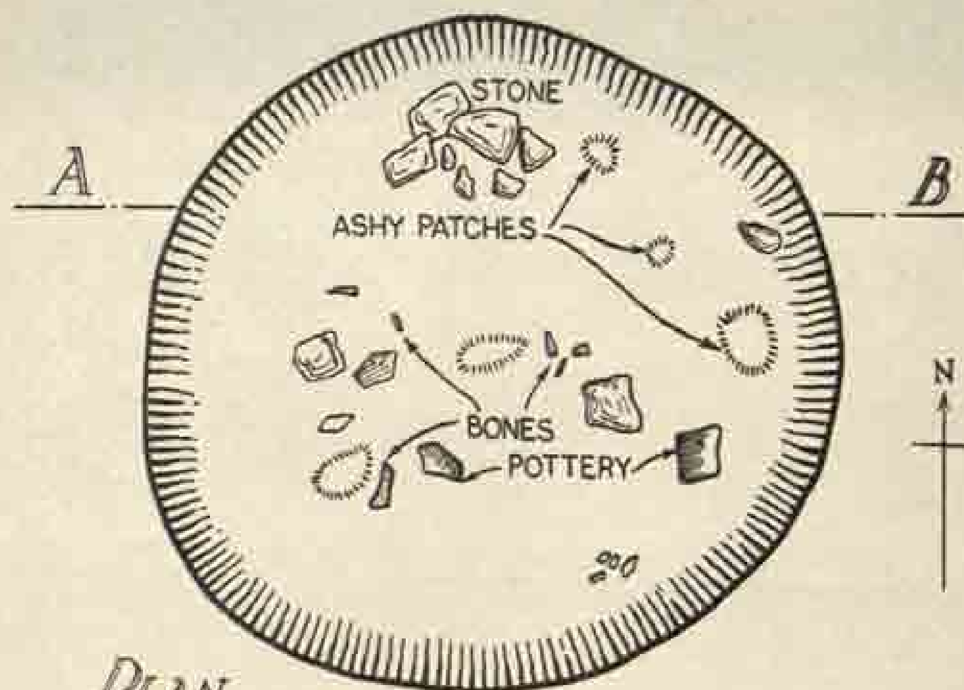
Fig. 53. Plan showing the distribution of pits, Site No. 47. *See p. 94*

SITE 47 SECTOR NIV

PIT 1



SECTION



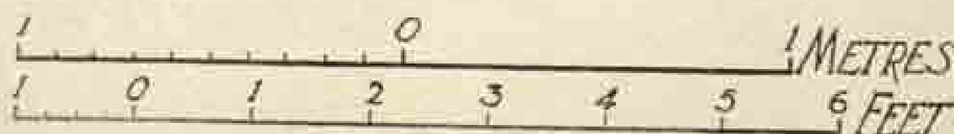


Fig. 54. Section and Plan of Pit No. 1, Site No. 47. See p. 94

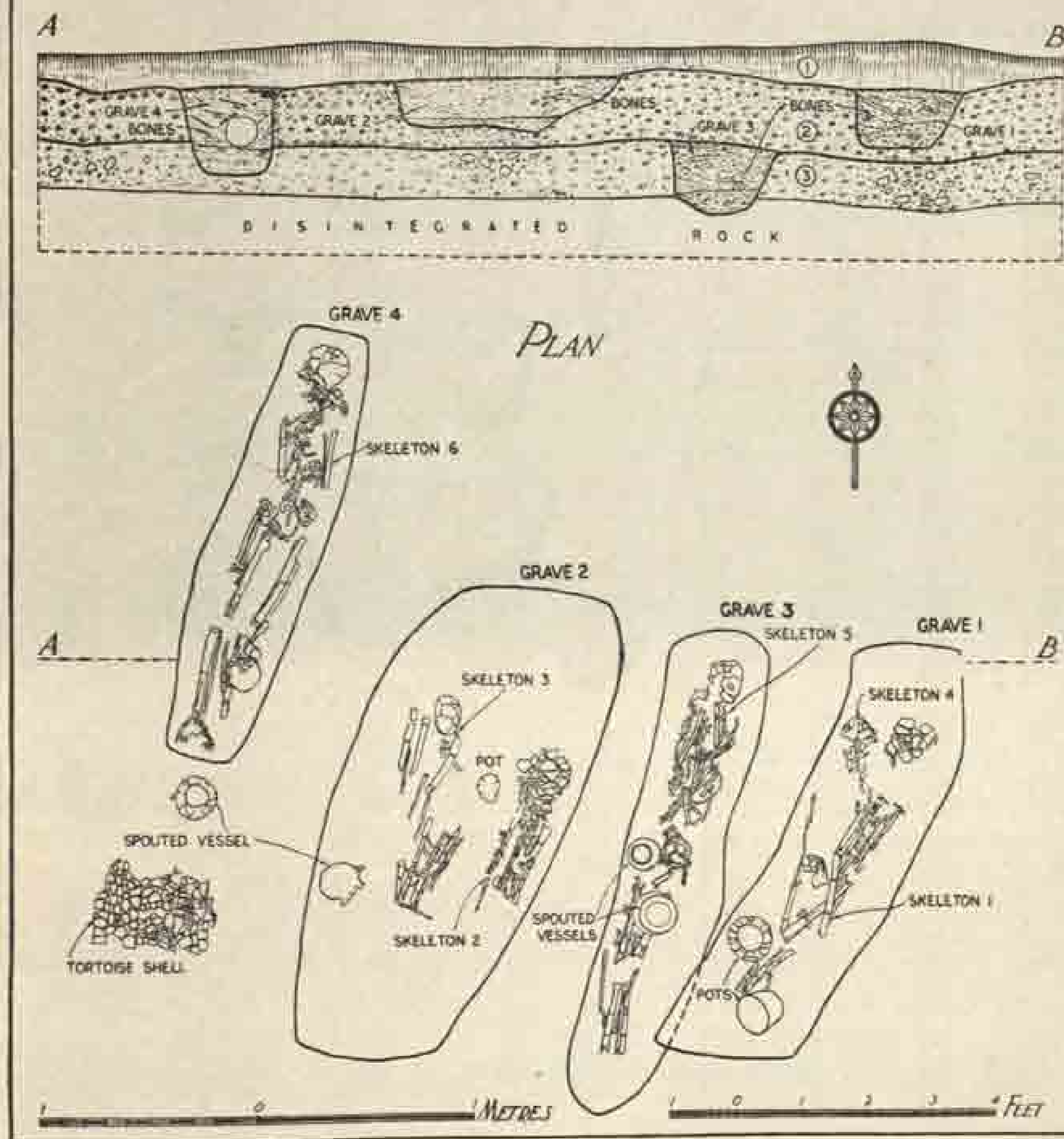


Fig. 55. Section and plan of neolithic grave; Site No. 68. See p. 103

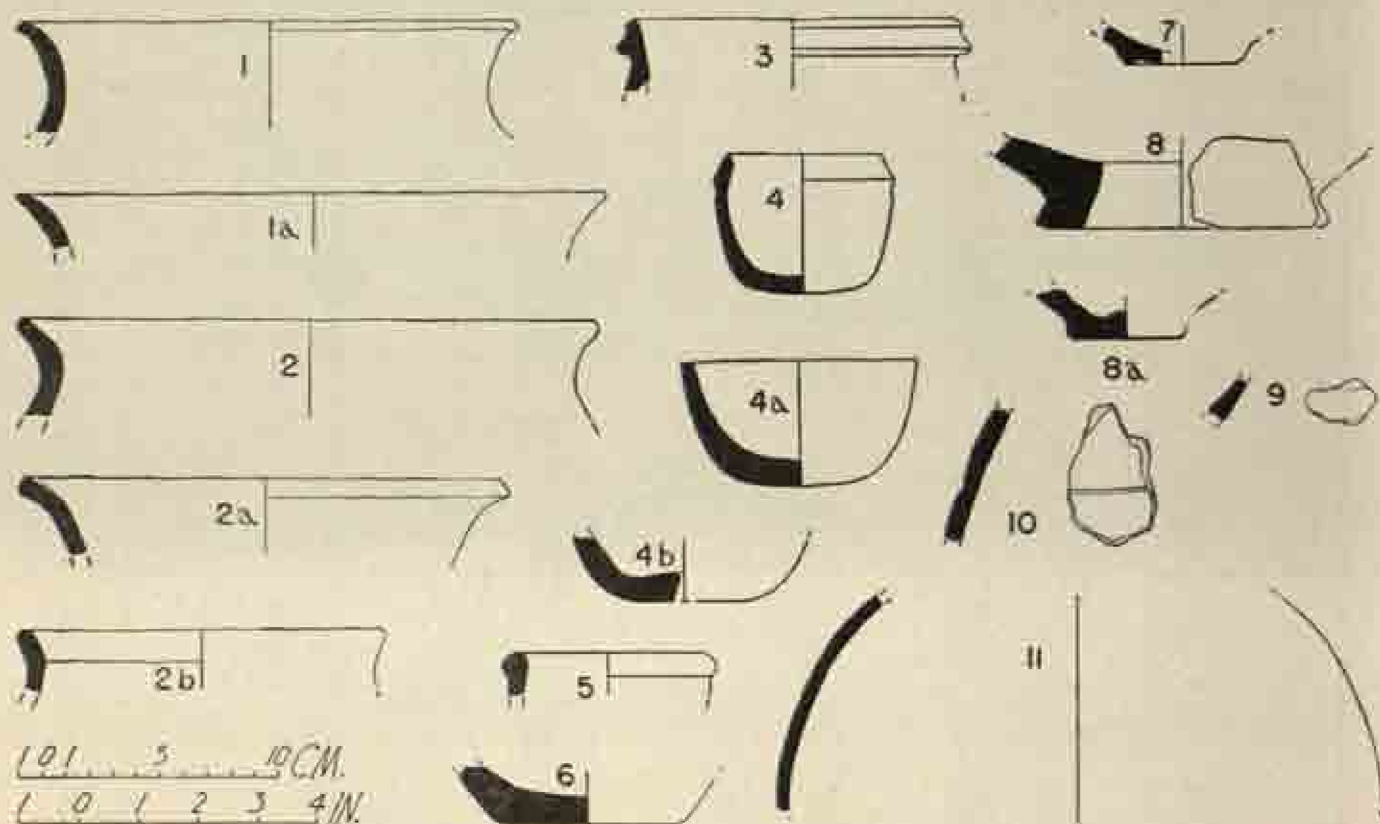


Fig. 56. Microlithic pottery types. *See p. 114*

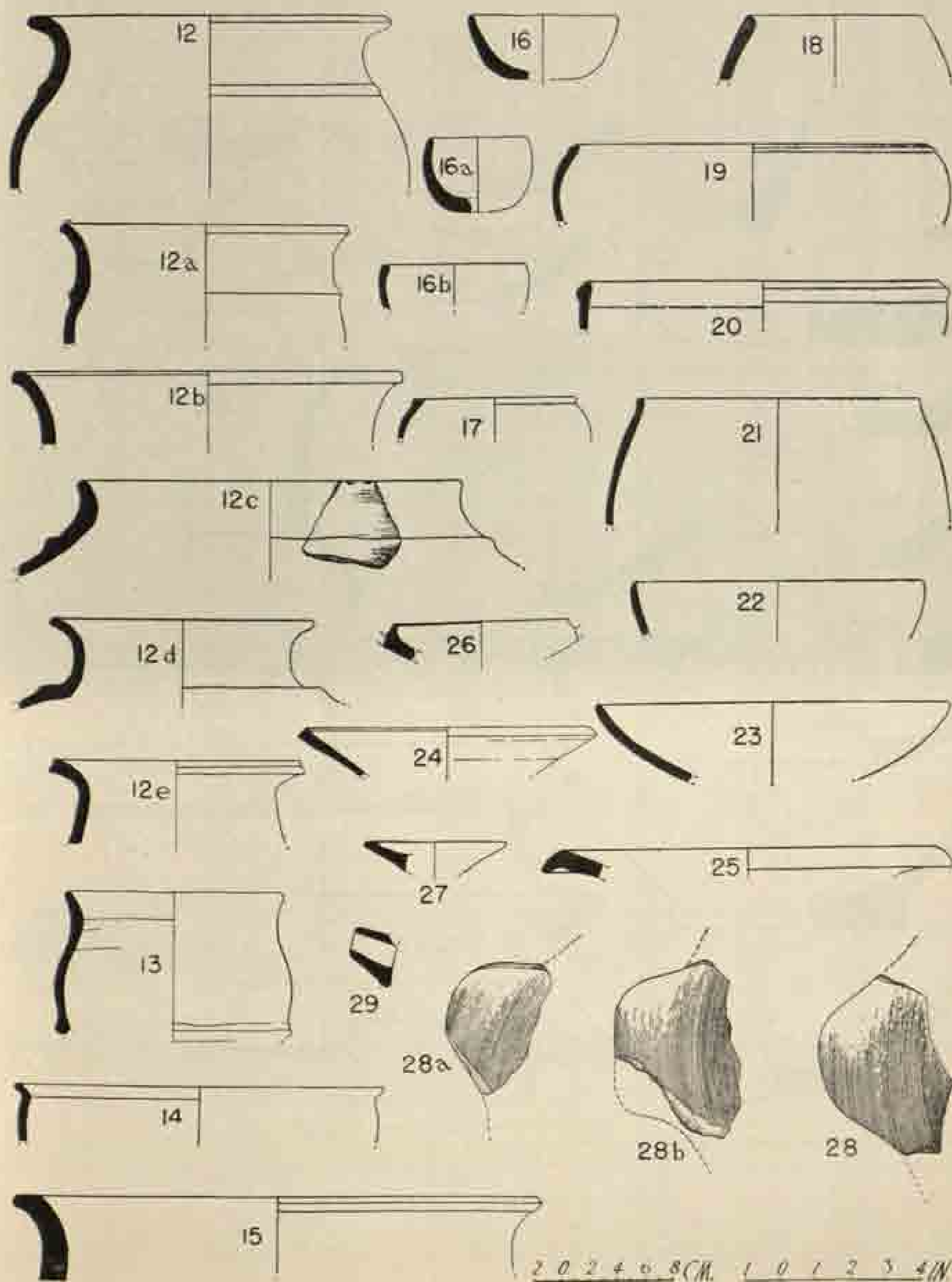


Fig. 57.—Neolithic pottery types. See pp. 116–118.

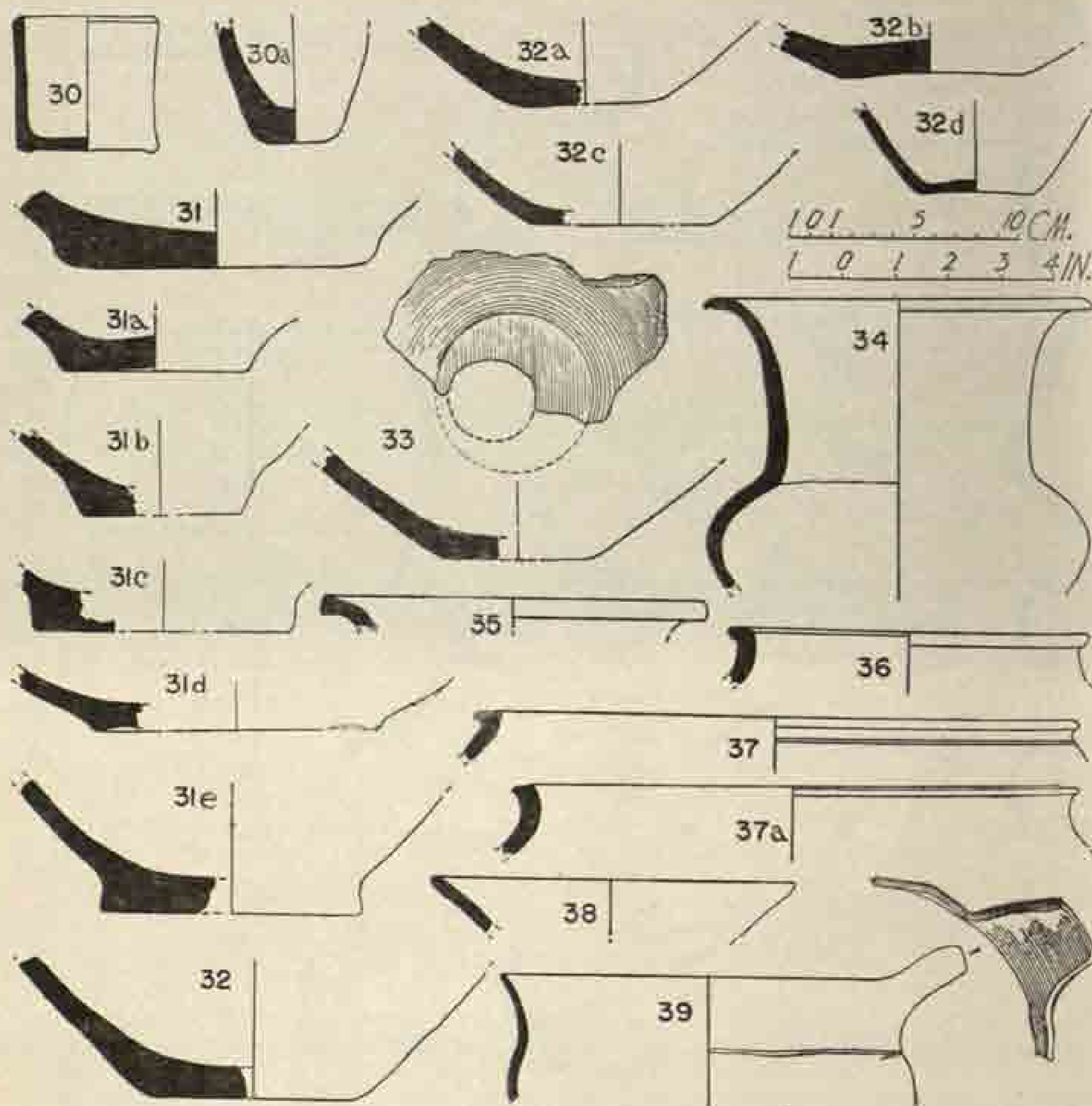


Fig. 58. Neolithic pottery types. See pp. 118-120

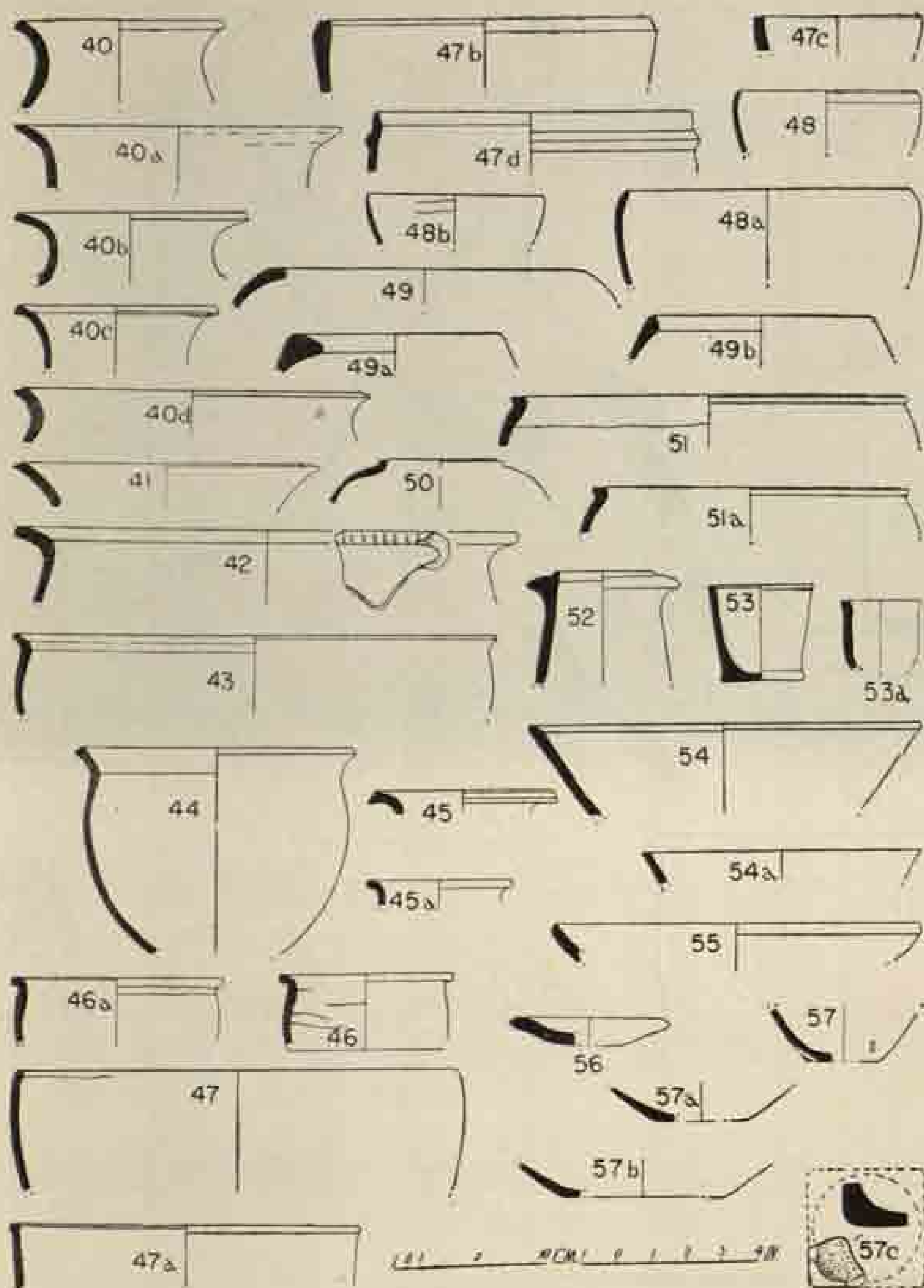


Fig. 59. Neolithic pottery types. See pp. 120–122

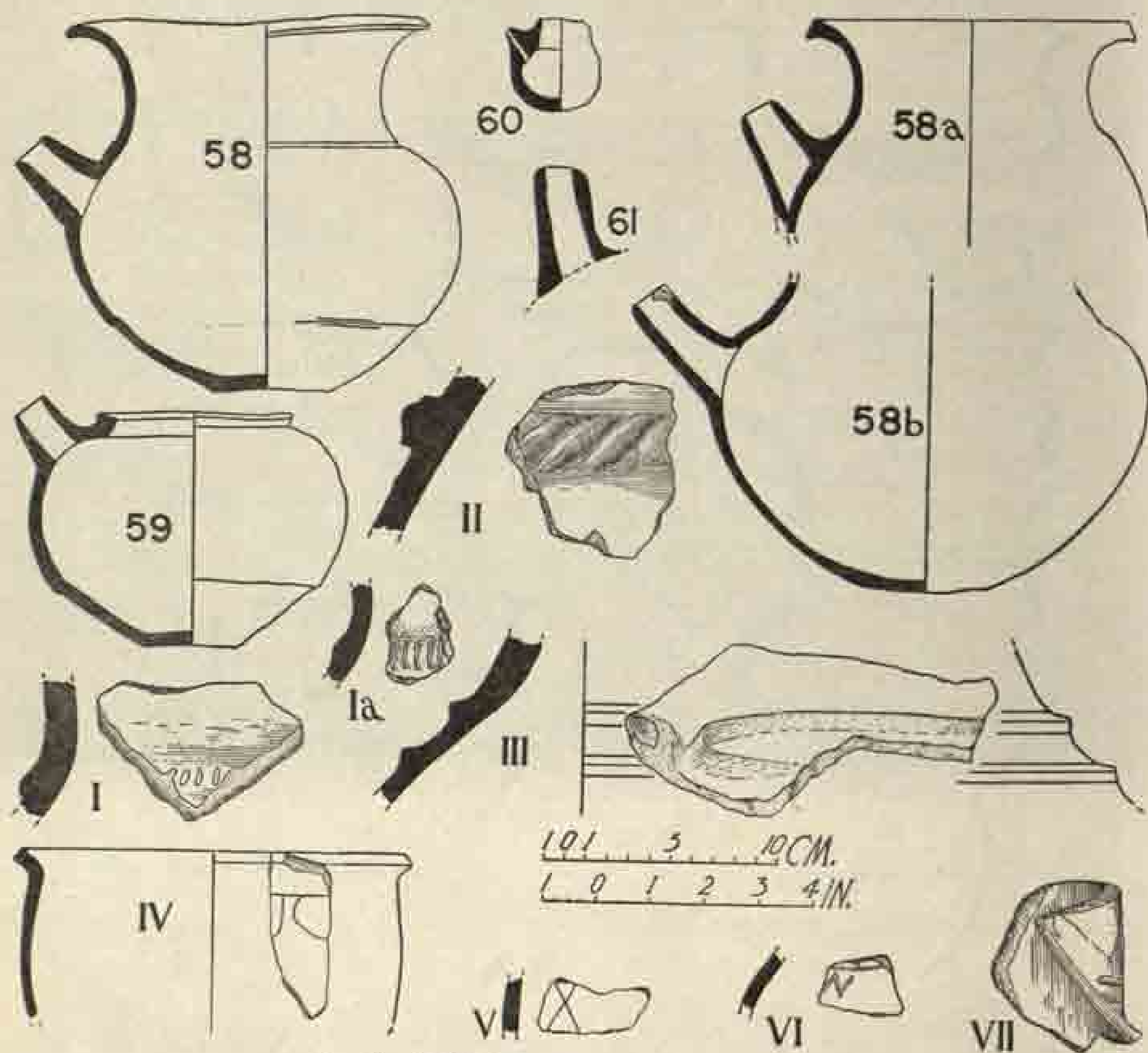


Fig. 60. Neolithic pottery types. See pp. 122 and 123.

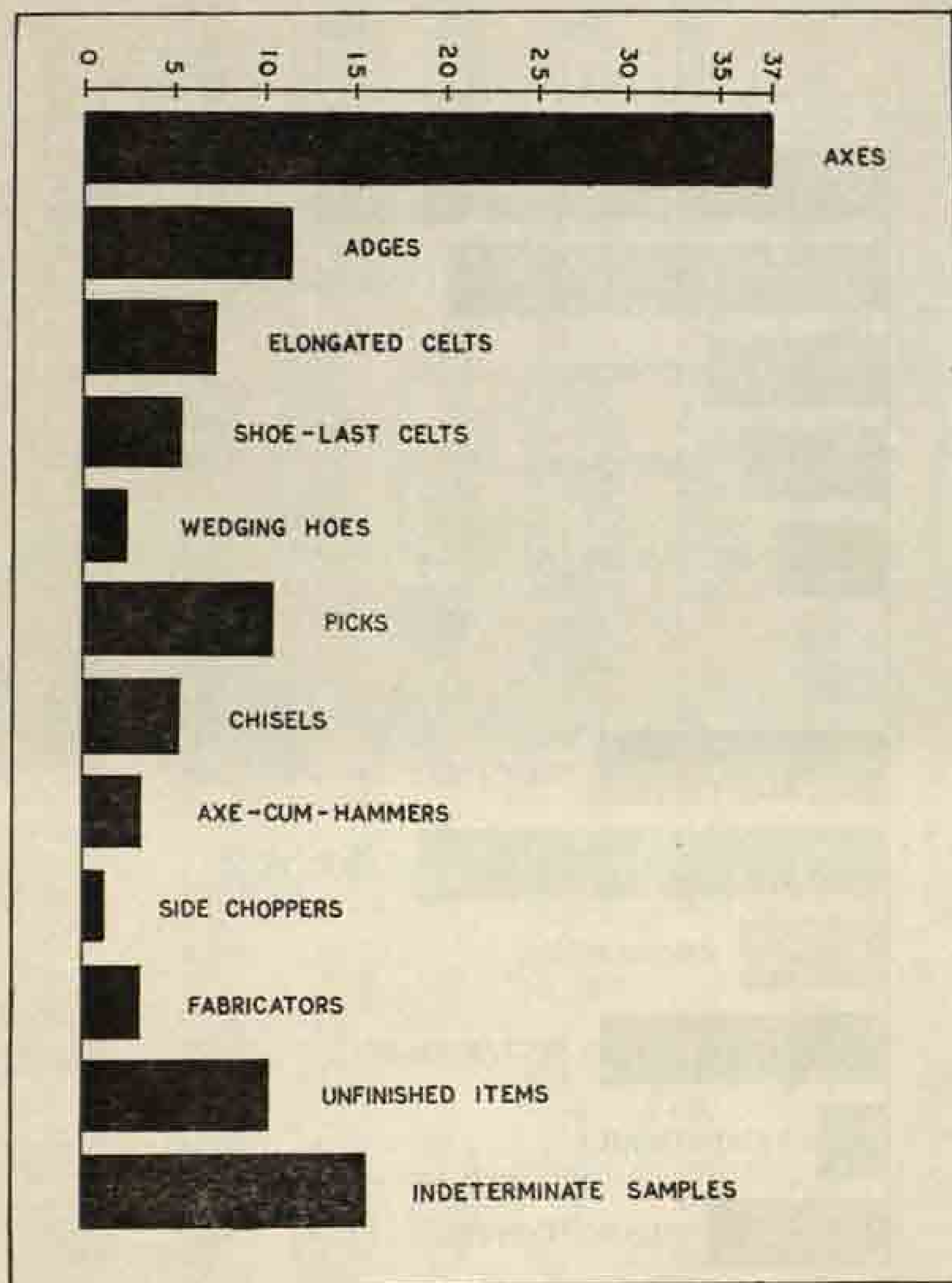


Fig. 61. Frequency distribution of neolithic types. See pp. 127 and 128

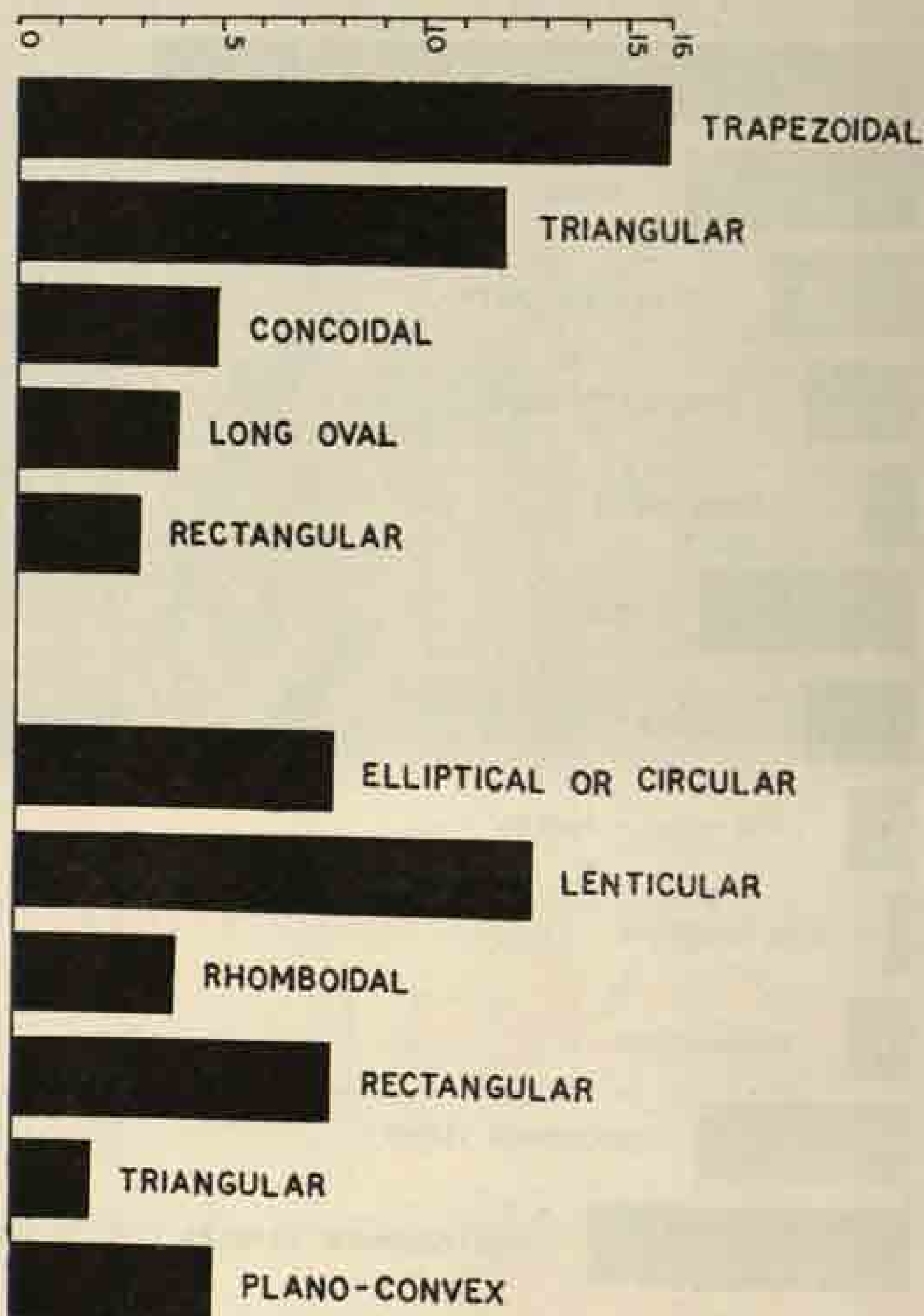


Fig. 62. External form frequencies of axes ; mid-cross-section frequencies of axes. *See p. 130*

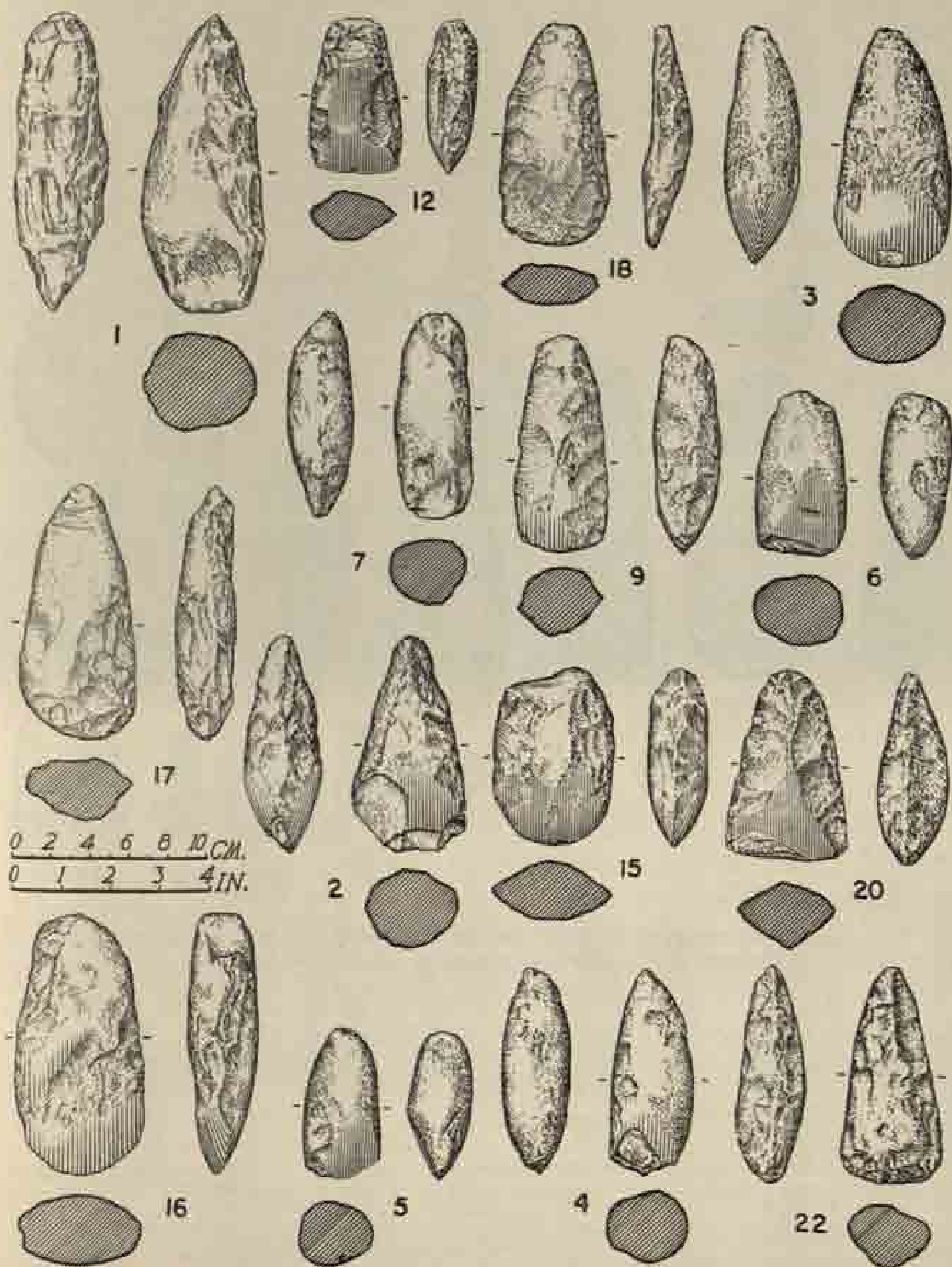


Fig. 63. Axes Type 1. See pp. 131–133

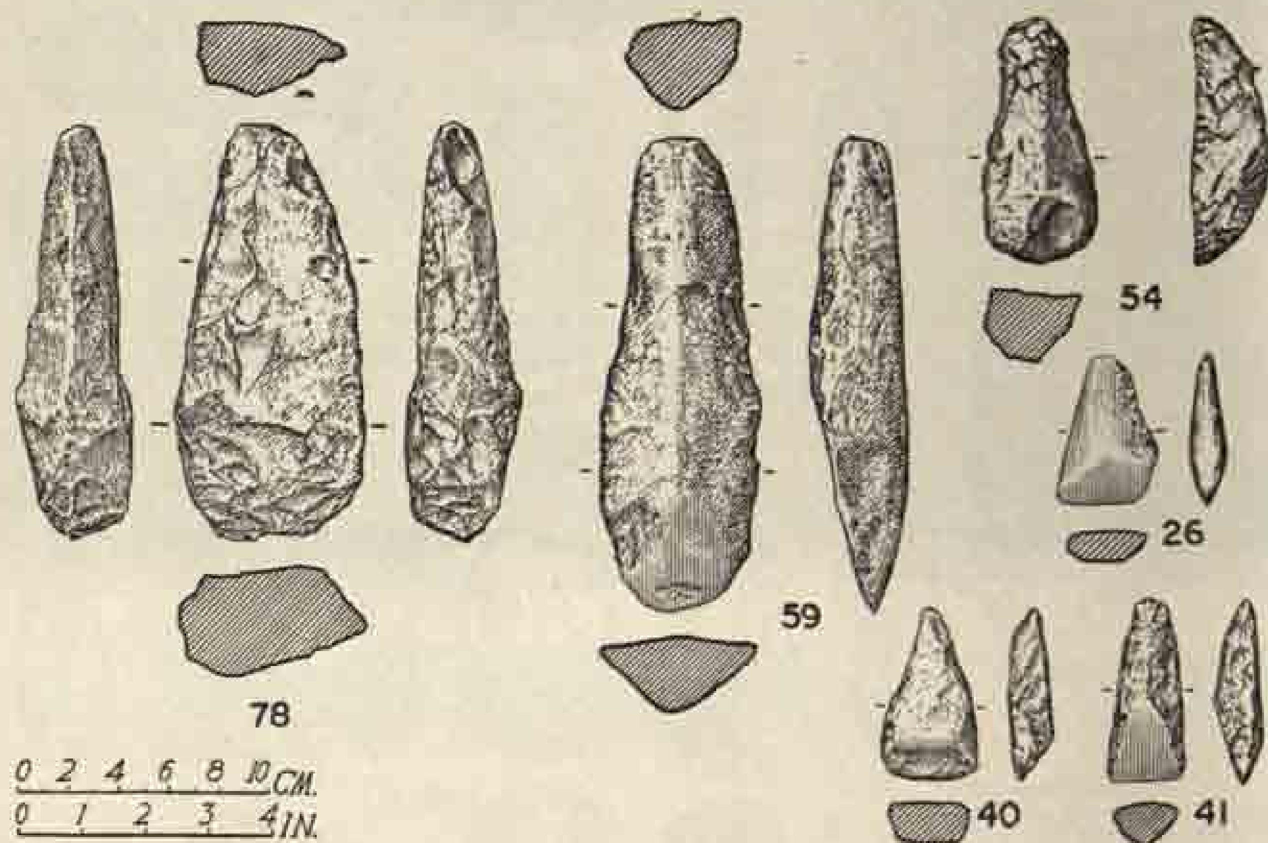


Fig. 64. 26 Axes type 1; 40 and 41 adzes type 2; 54 shoe last celt type 4; 59 long weeding hoes type 5; 78 side-chopper on flake type 9. See pp. 134–137 and 139

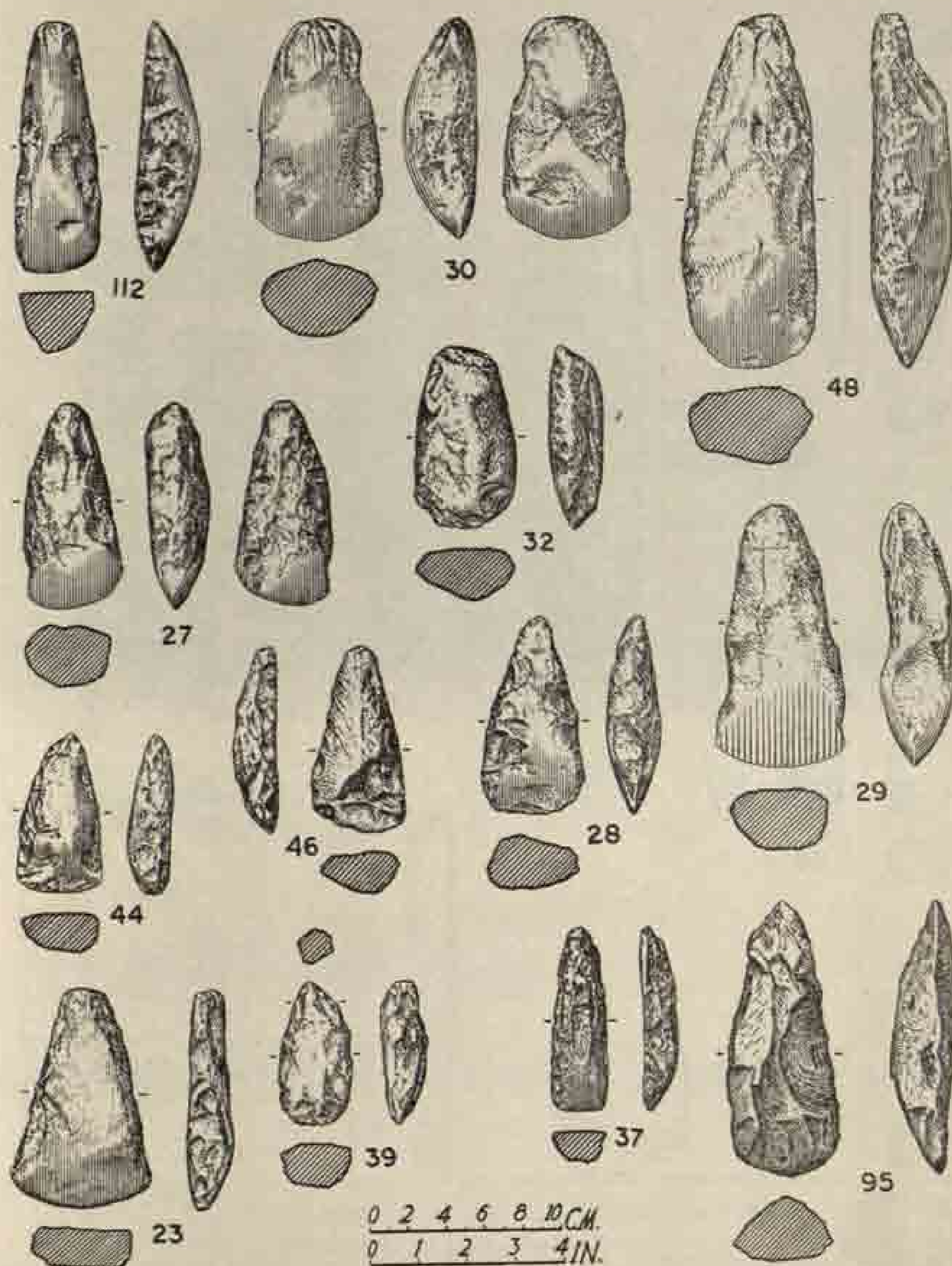


Fig. 65. 23, 27–32 Axes type 1; 37, 39 and 44 adzes type 2; 48 celts type 3; 95 axe (surface). See pp. 134–136, 154 and 155

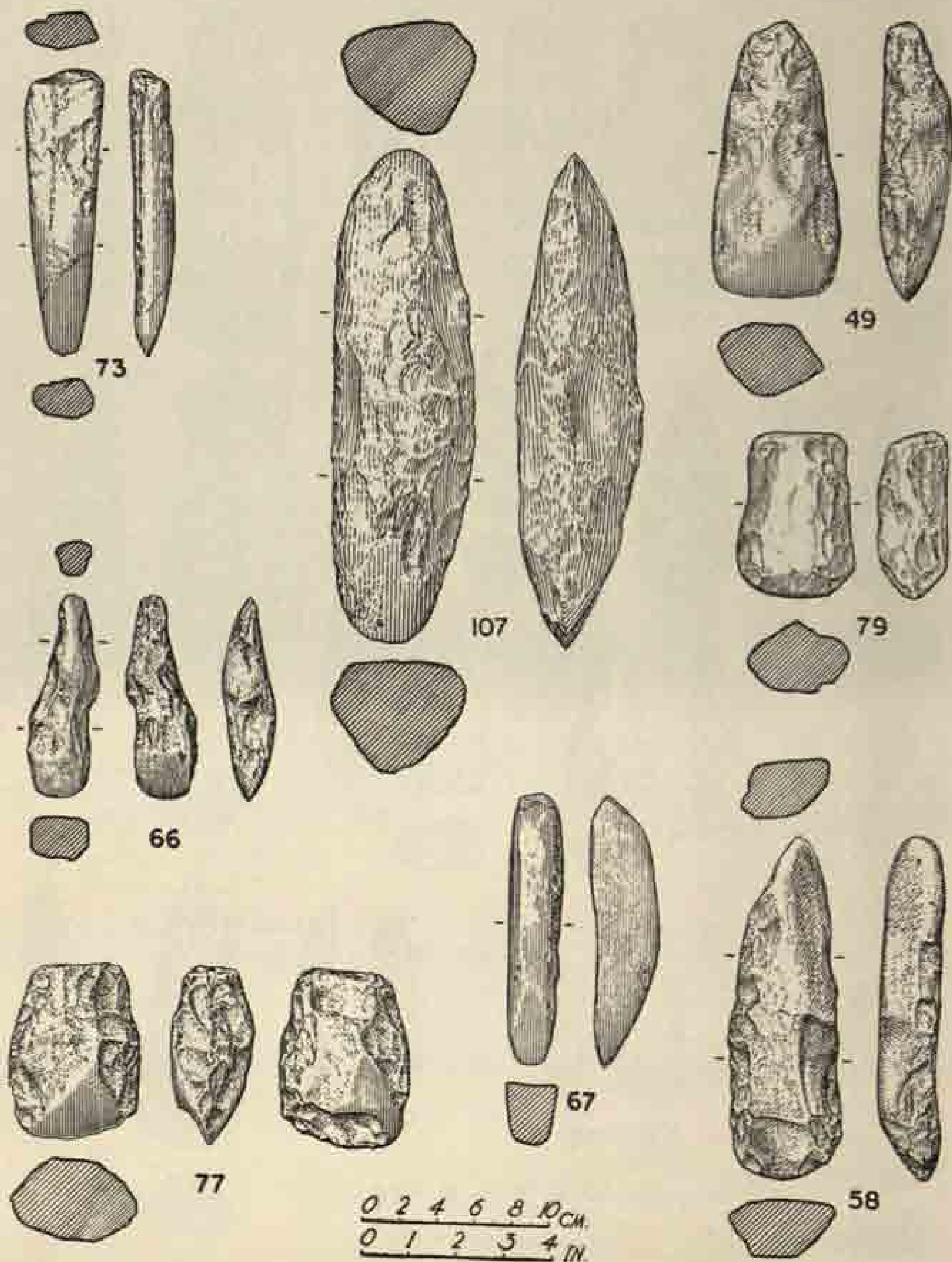


Fig. 66. Celts, Long weeding hoe, picks, chisel, axe-cum-hammer, fabricators and double-edged pick. See pp. 135–139

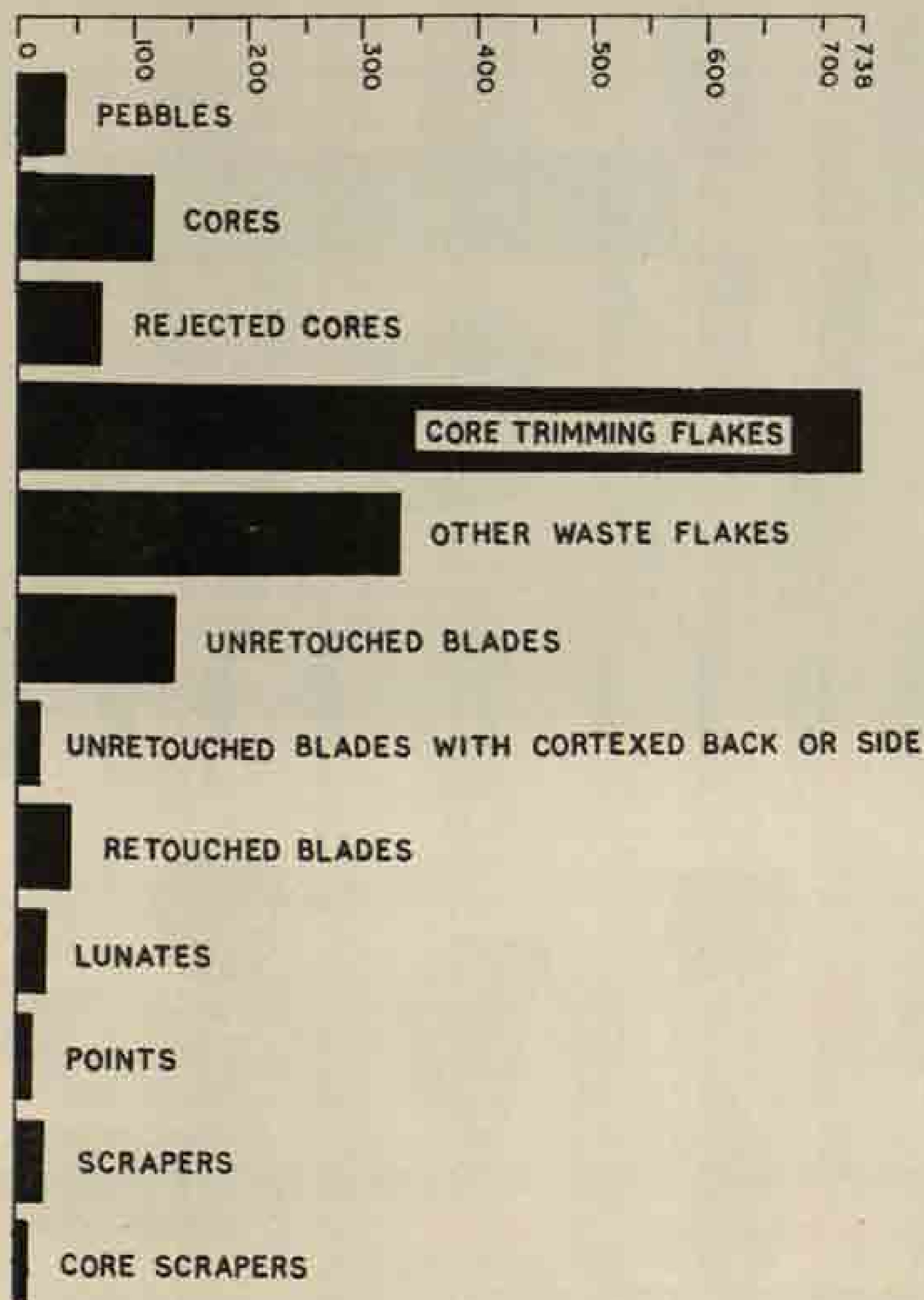


Fig. 67. Classification of implements from Site No. 45. See p. 142

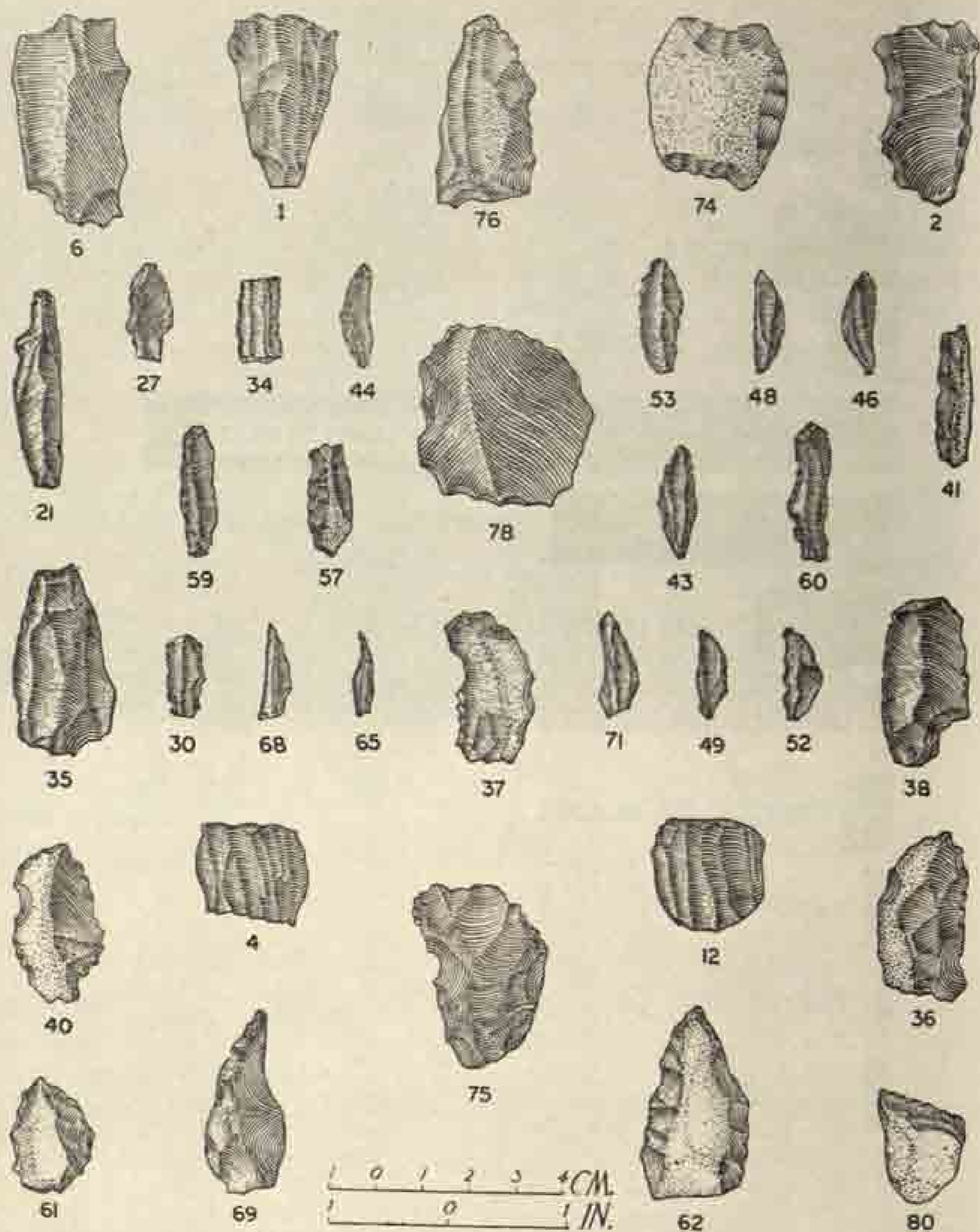


Fig. 68. Cores, blades, lunates, points and scrapers, microlithic industry. See pp. 142–148

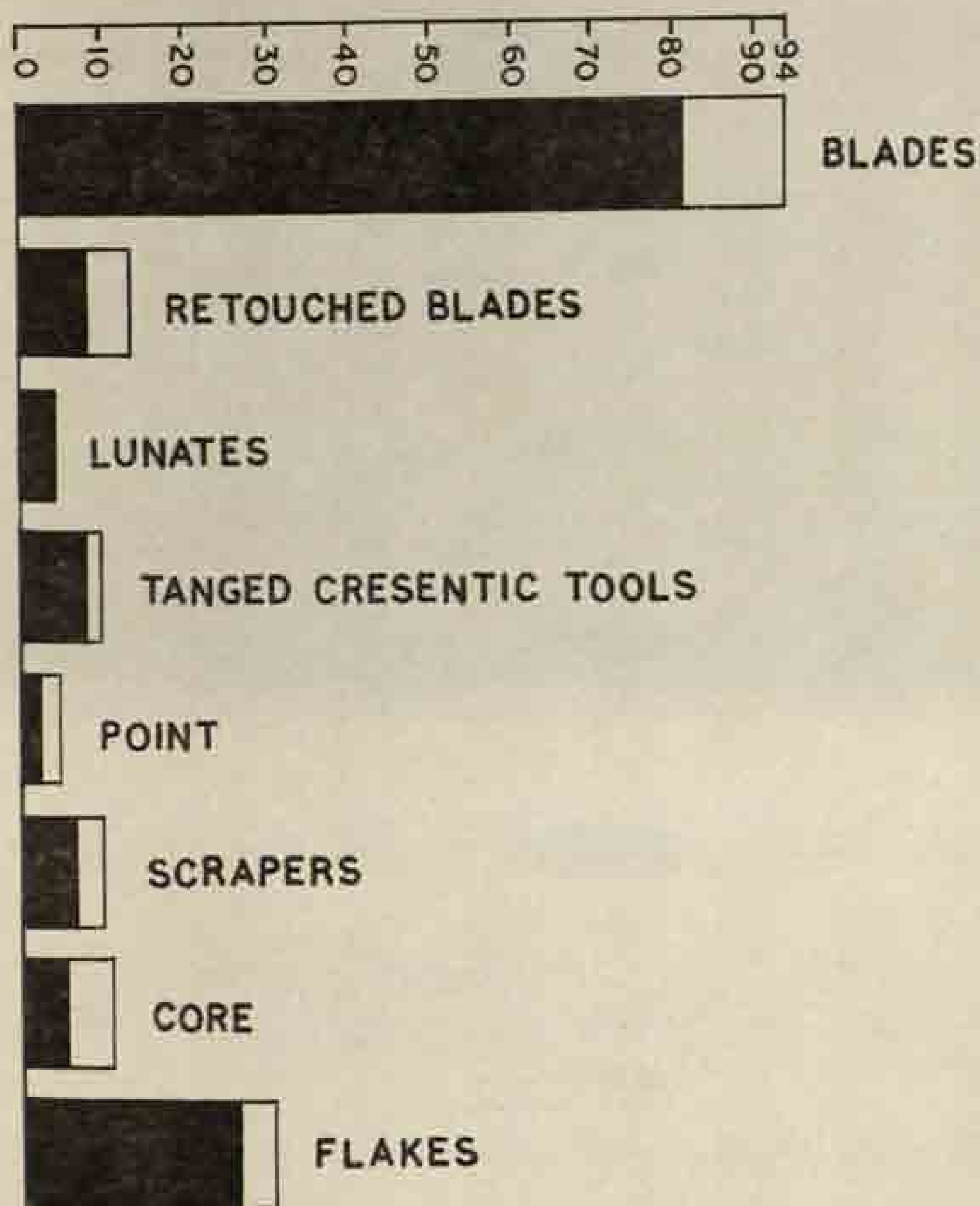


Fig. 69. Classification of tools; Site No. 46. *See p. 148*

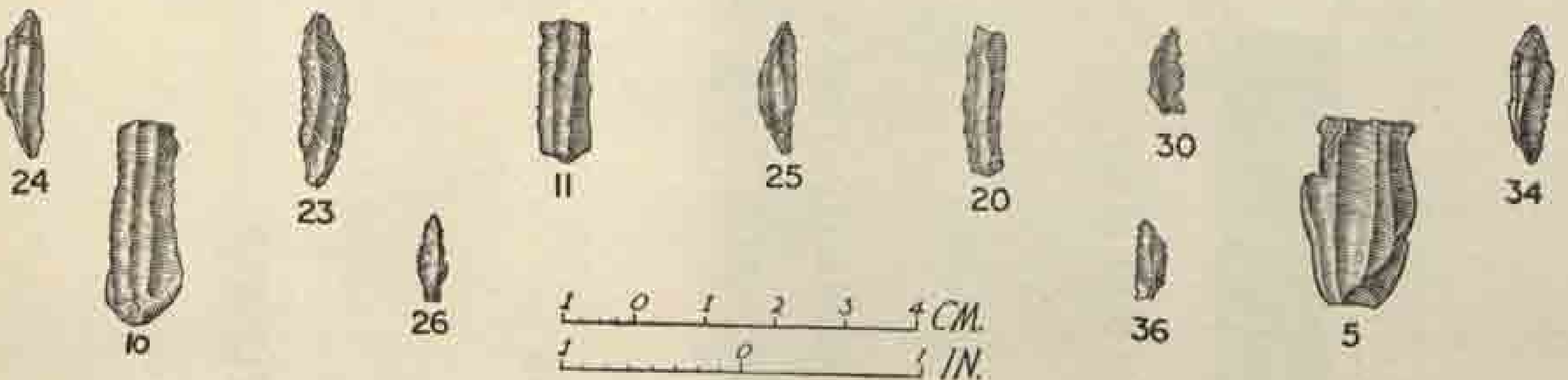


Fig. 70. Scrapers, blades, lunates and tanged crescentic tools. See pp. 150–153

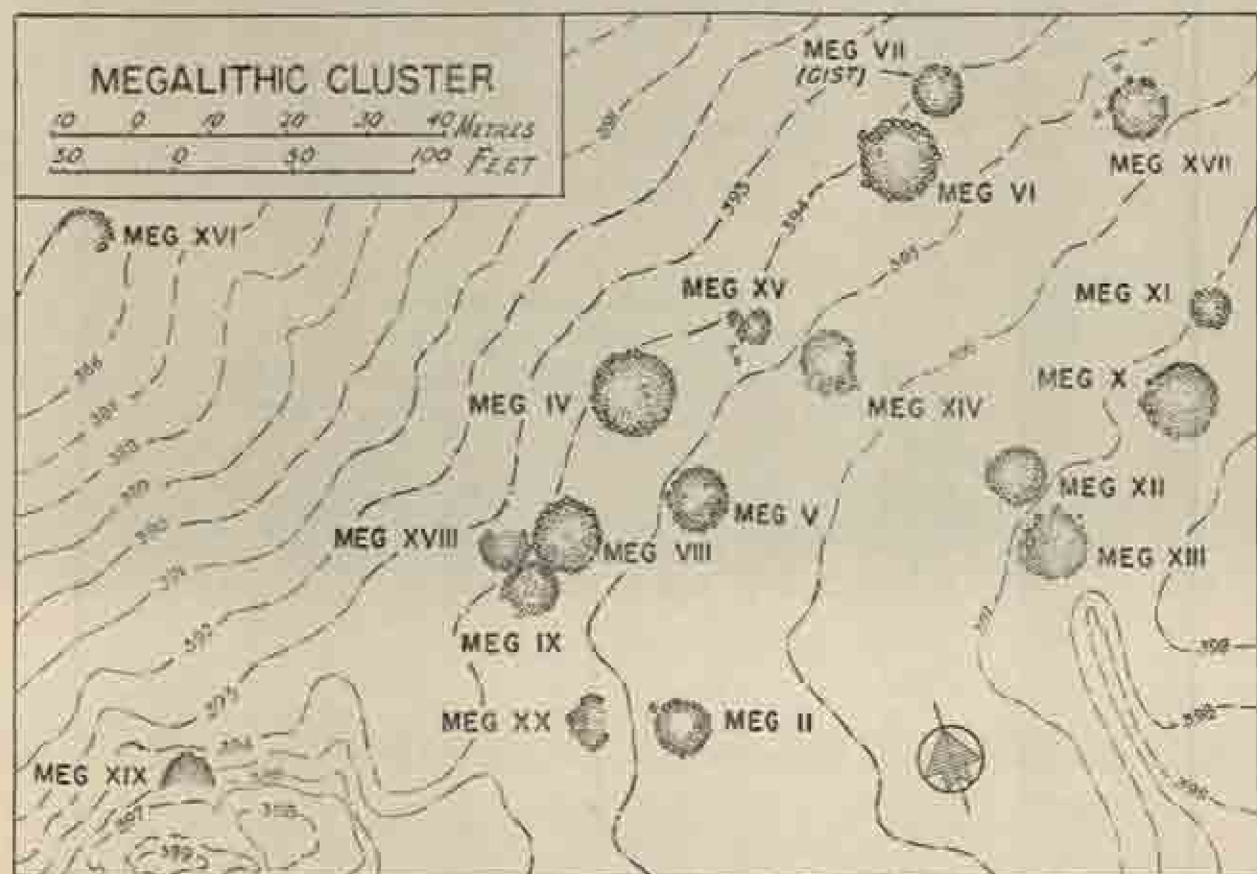


Fig. 71. Site No. 63. See p. 165

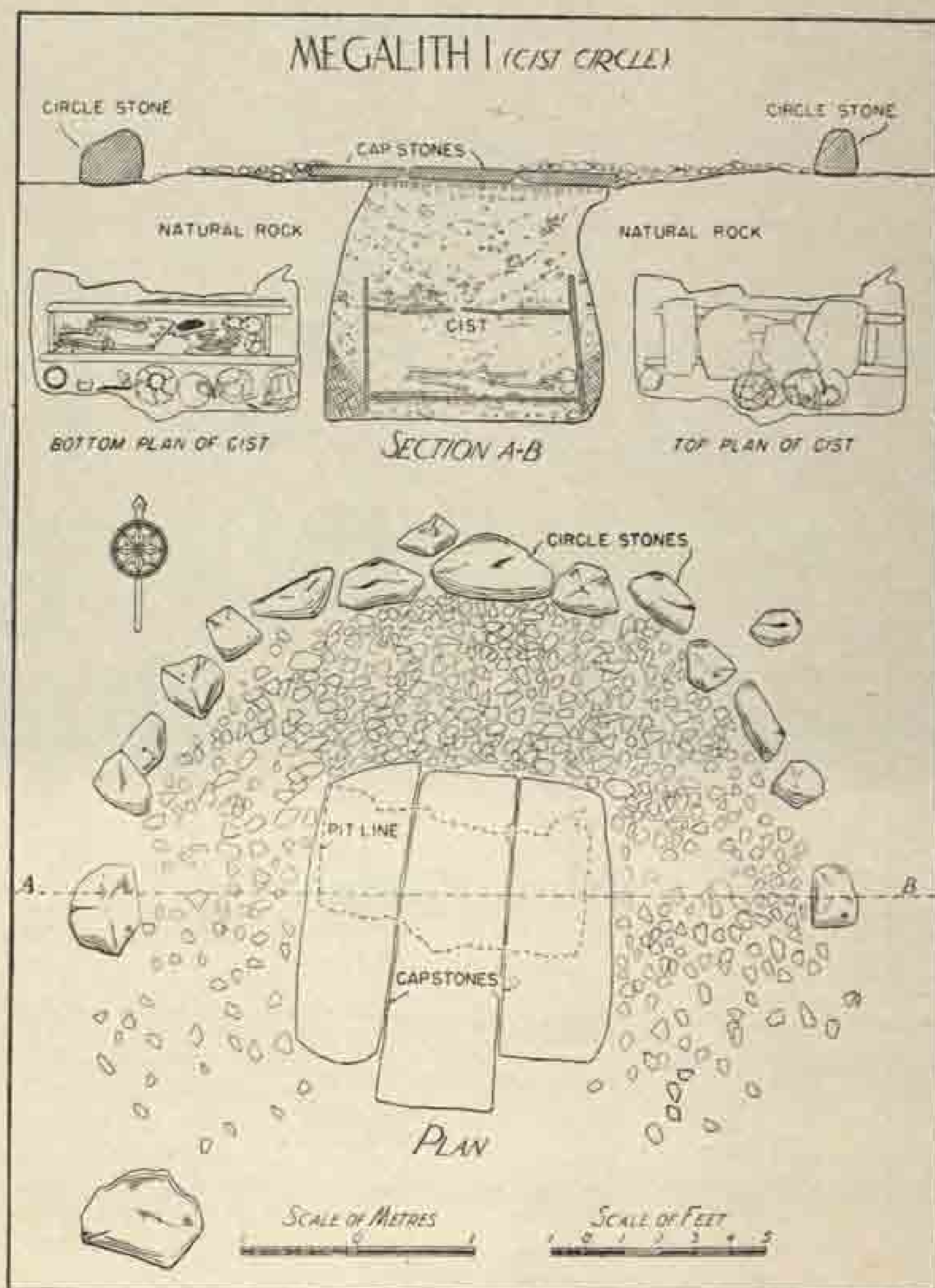


Fig. 72. Megalith I; Site No. 44. See p. 166

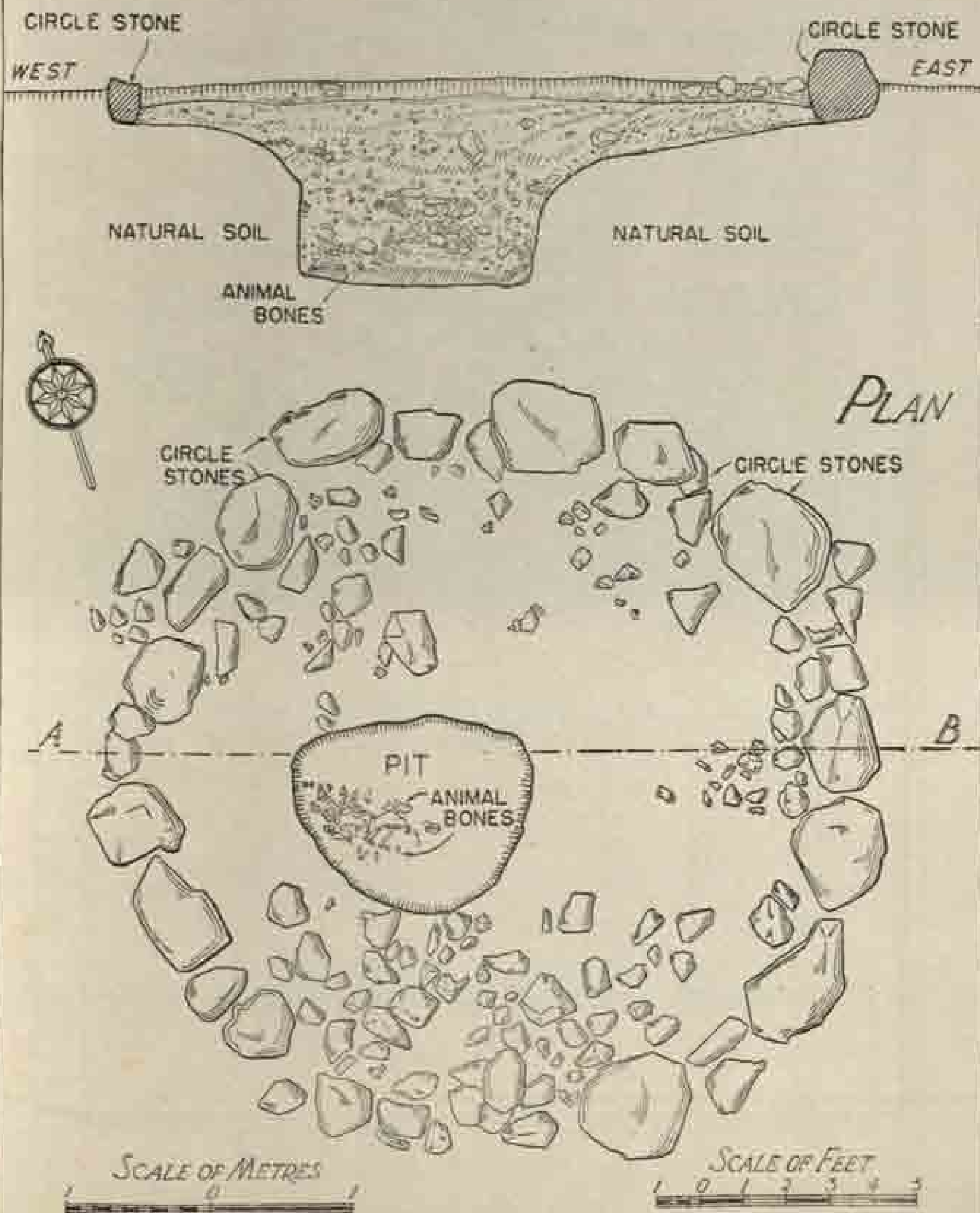


Fig. 73. Megalith III; Site No. 76. *See p. 168*

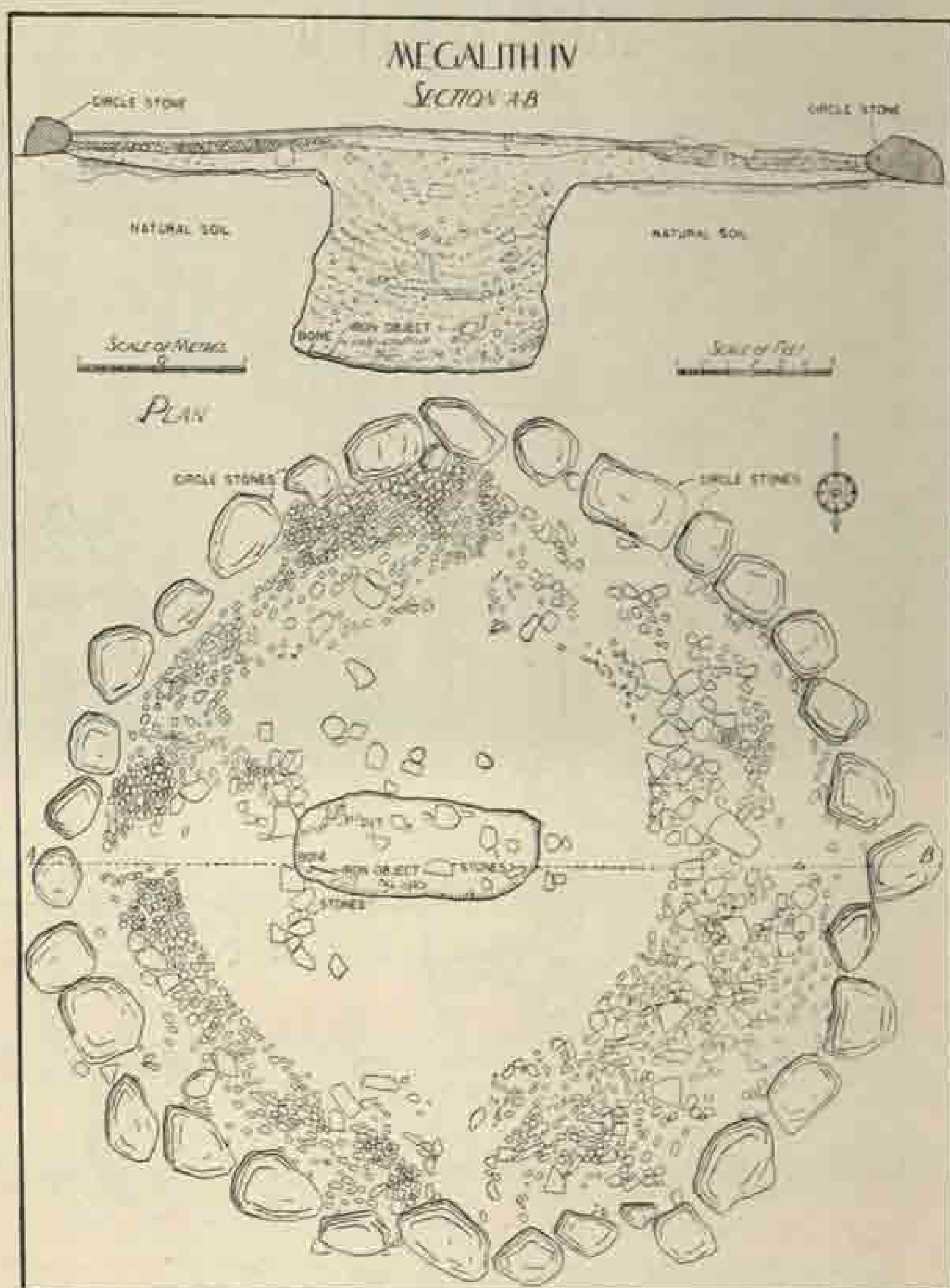


Fig. 74. Megalith IV; Site No. 63. See p. 169

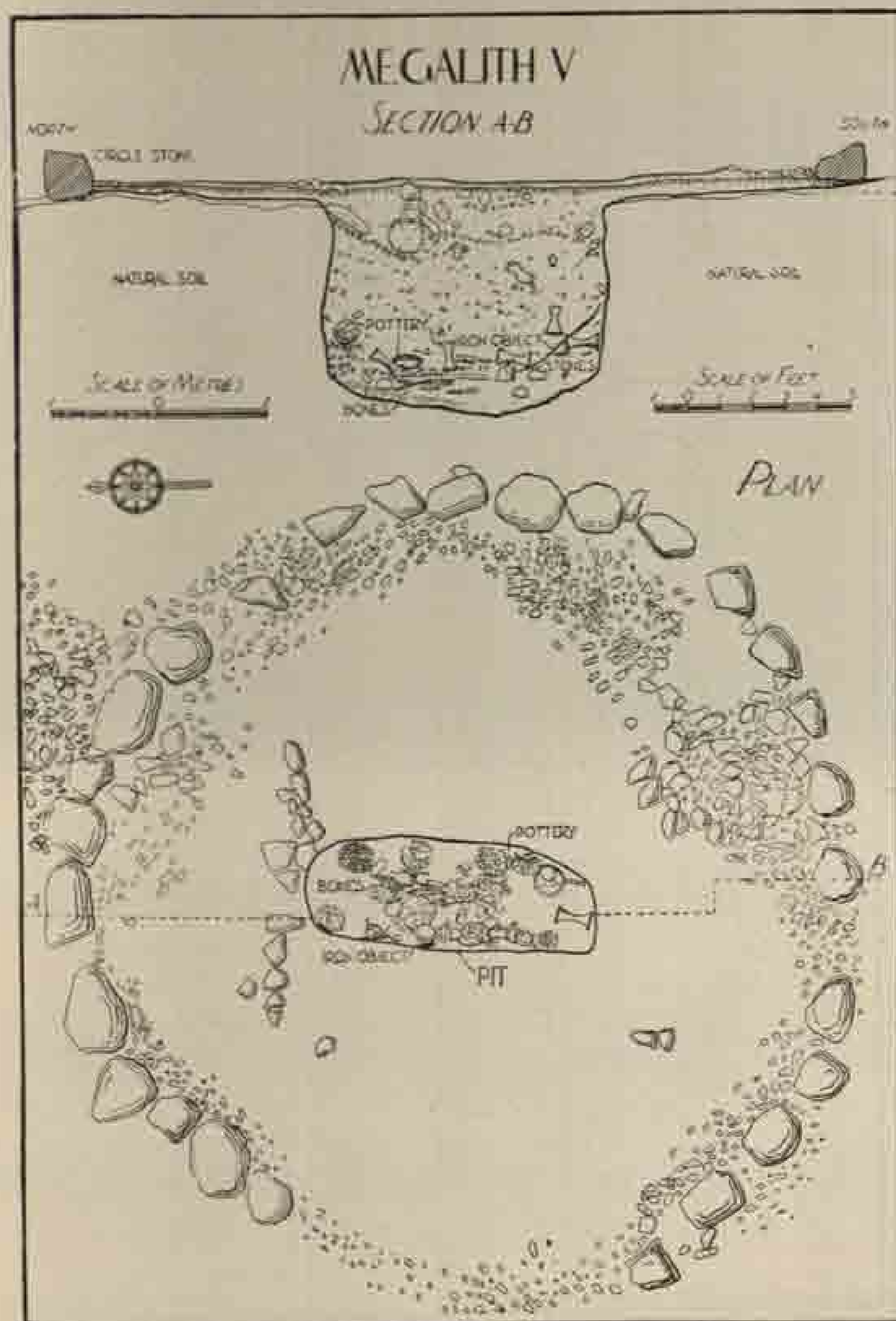


Fig. 75. Megalith V; Site No. 63. See p. 170

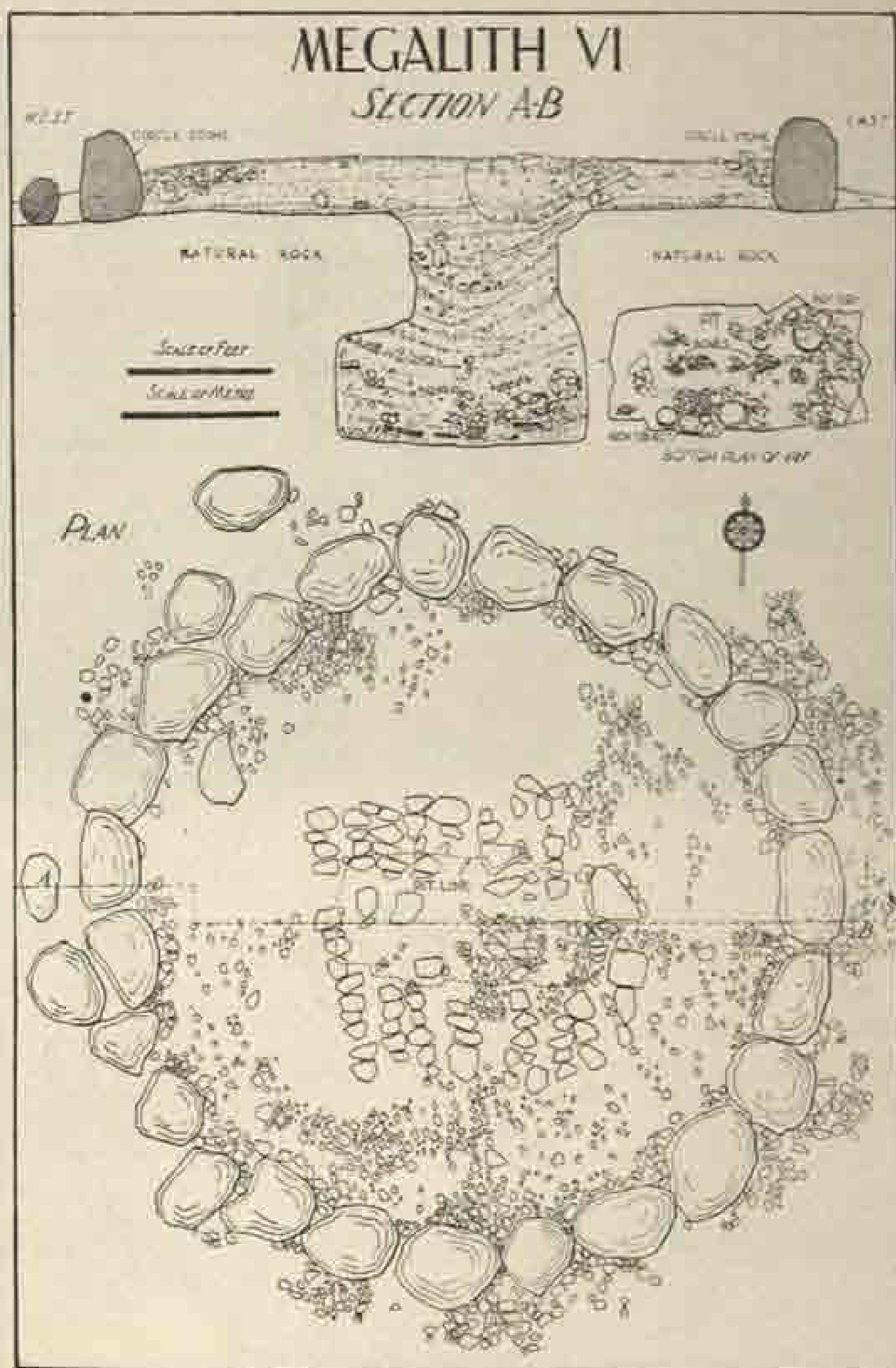


Fig. 76. Megalith VI; Site No. 63. See p. 170

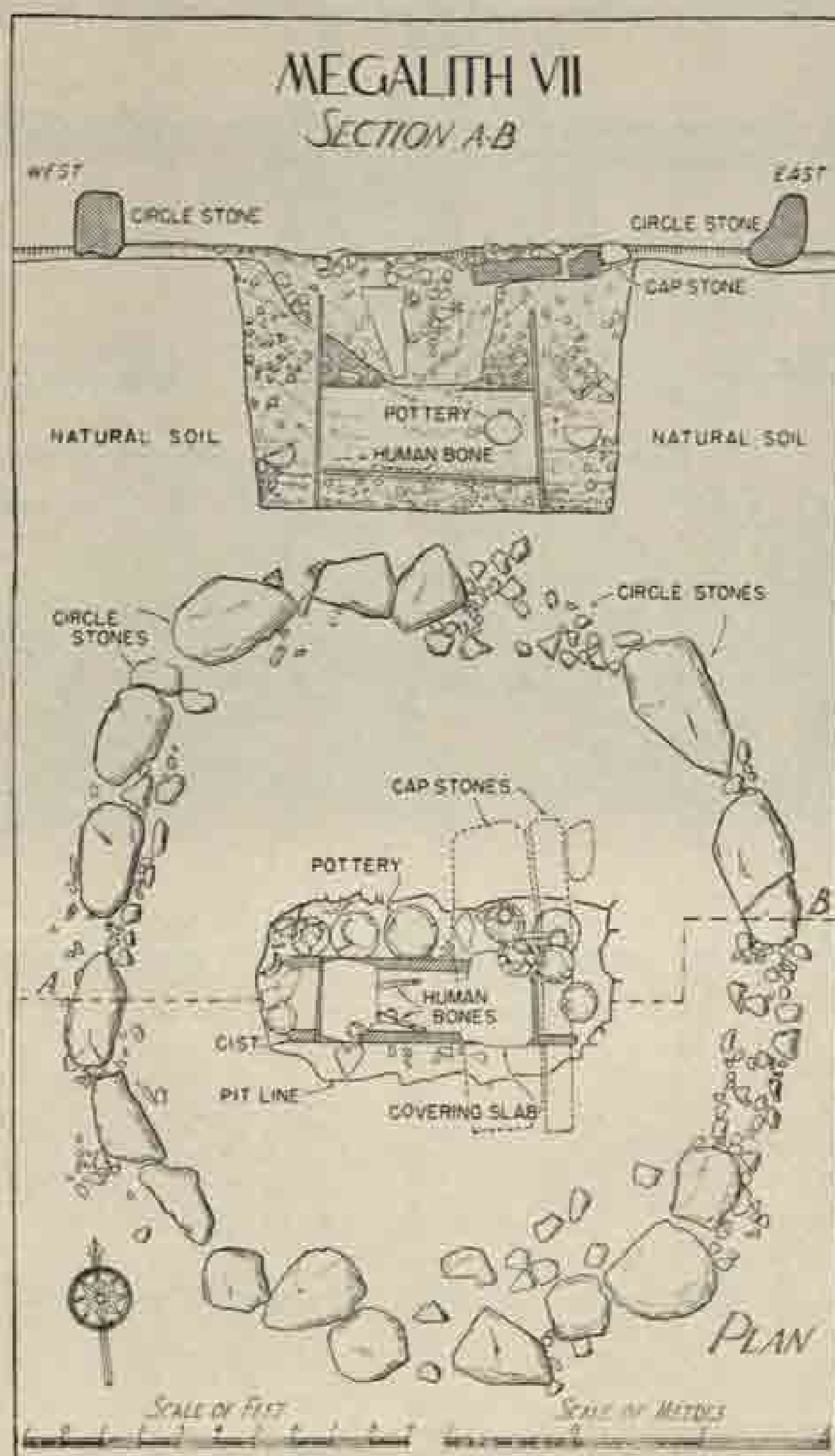


Fig. 77. Megalith VIII; Site No. 63. *See p. 171*

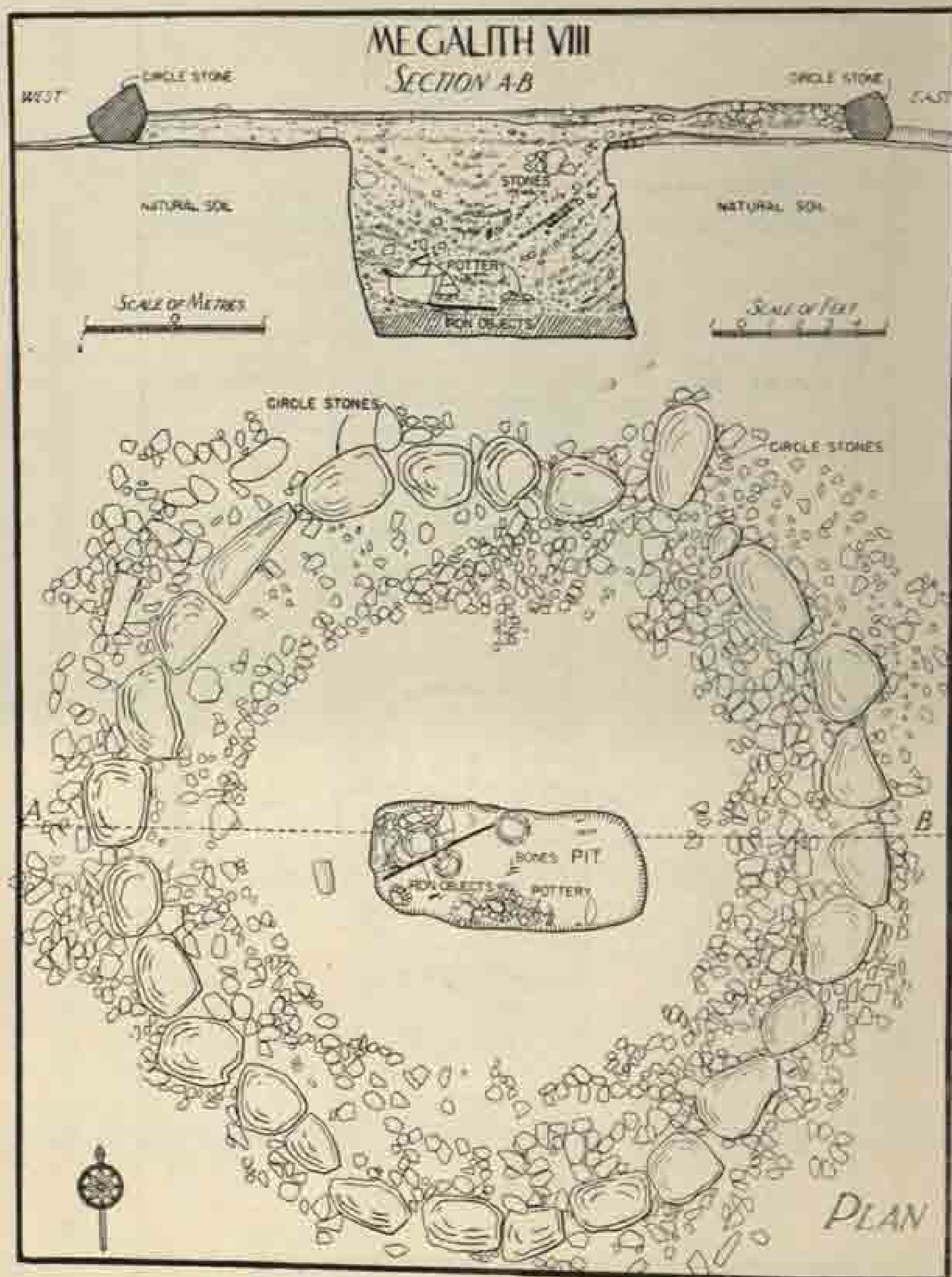


Fig. 78: Megalith VIII; Site No. 63. See p. 173

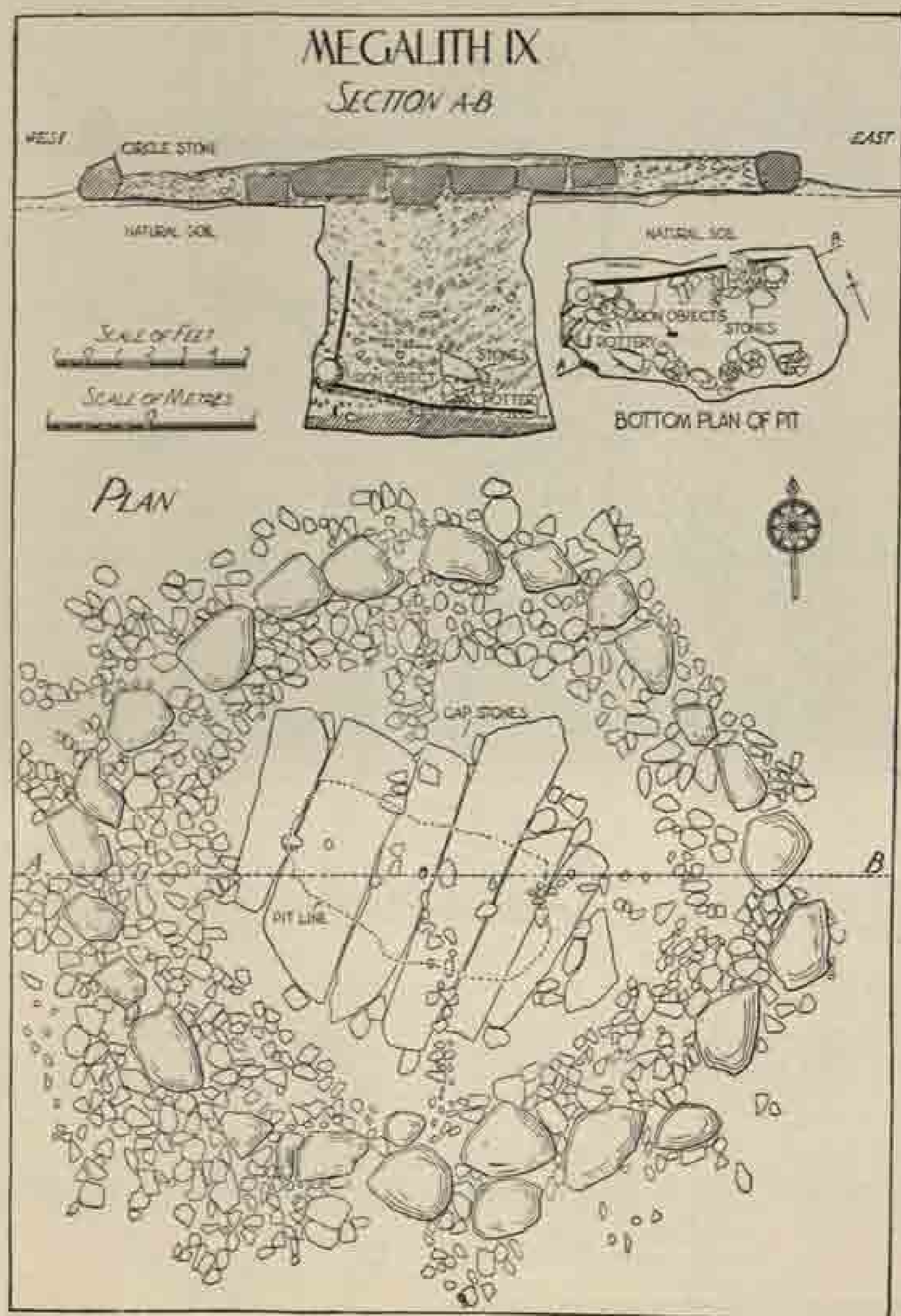


Fig. 79. Megalith IX; Site No. 63. See p. 174

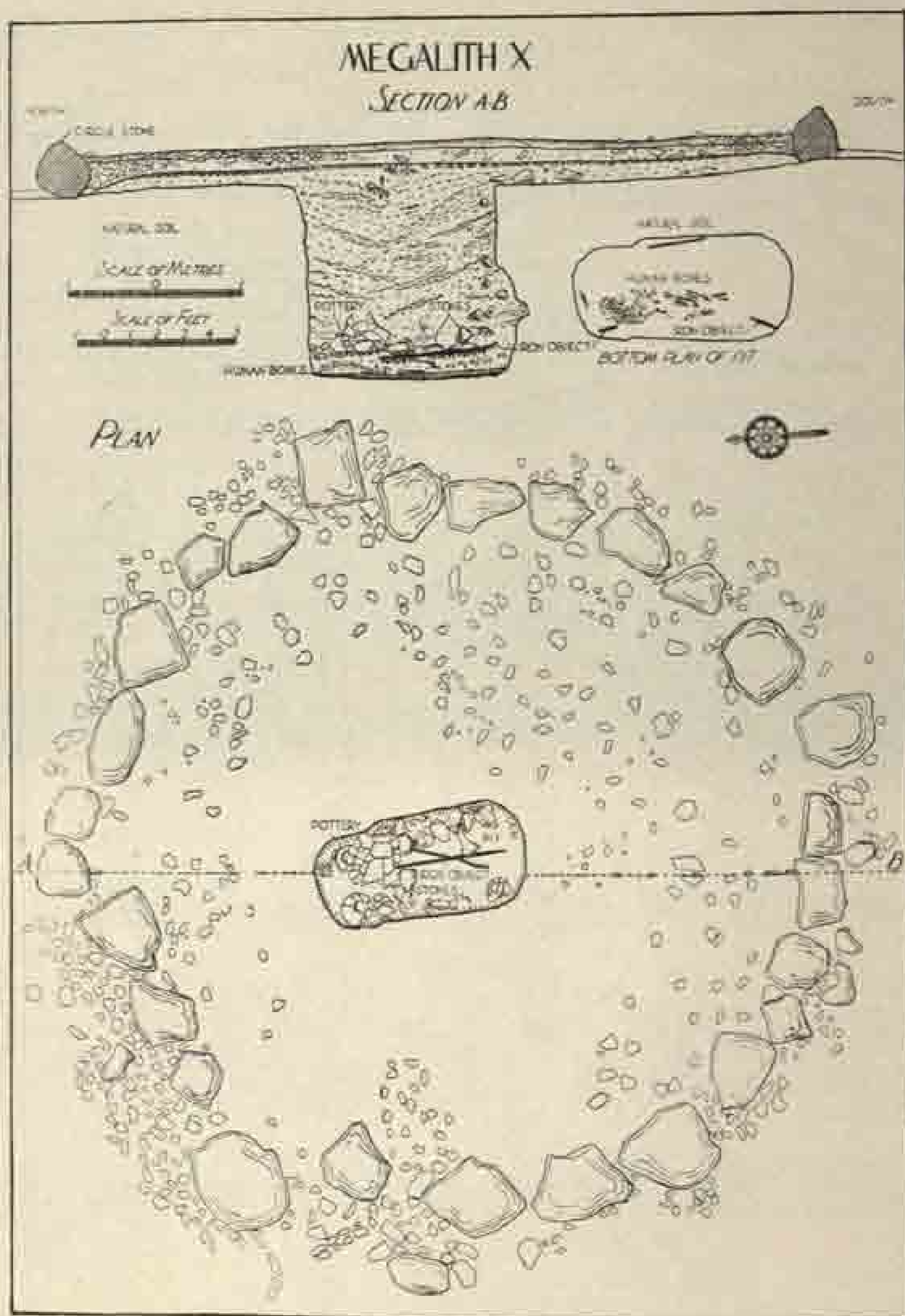


Fig. 80. Megalith X, during excavation; Site No. 63. See p. 175

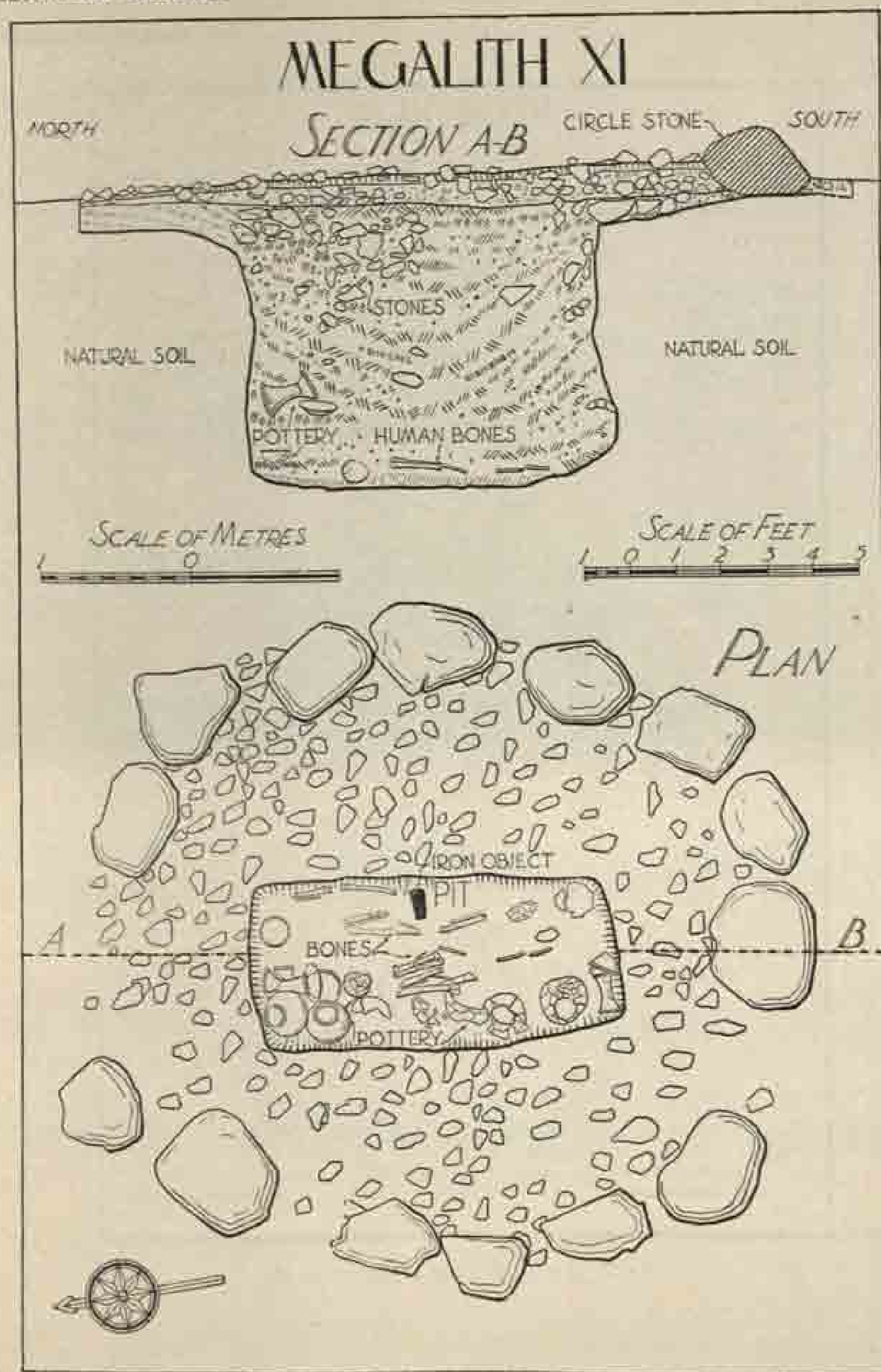


Fig. 81. Megalith XI; Site No. 63. *See p. 176*

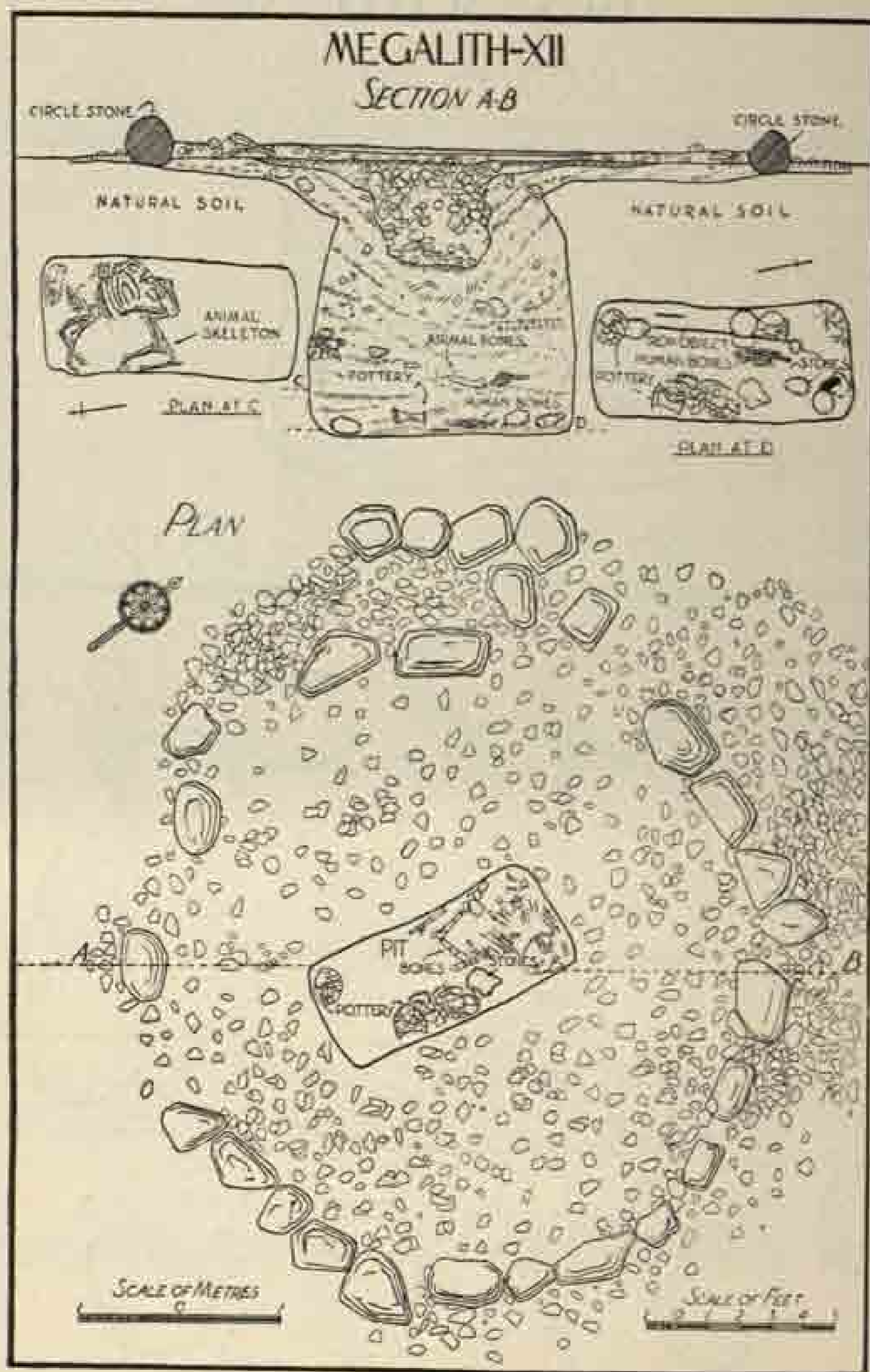


Fig. 82. Megalith XII; Site No. 63. See p. 177

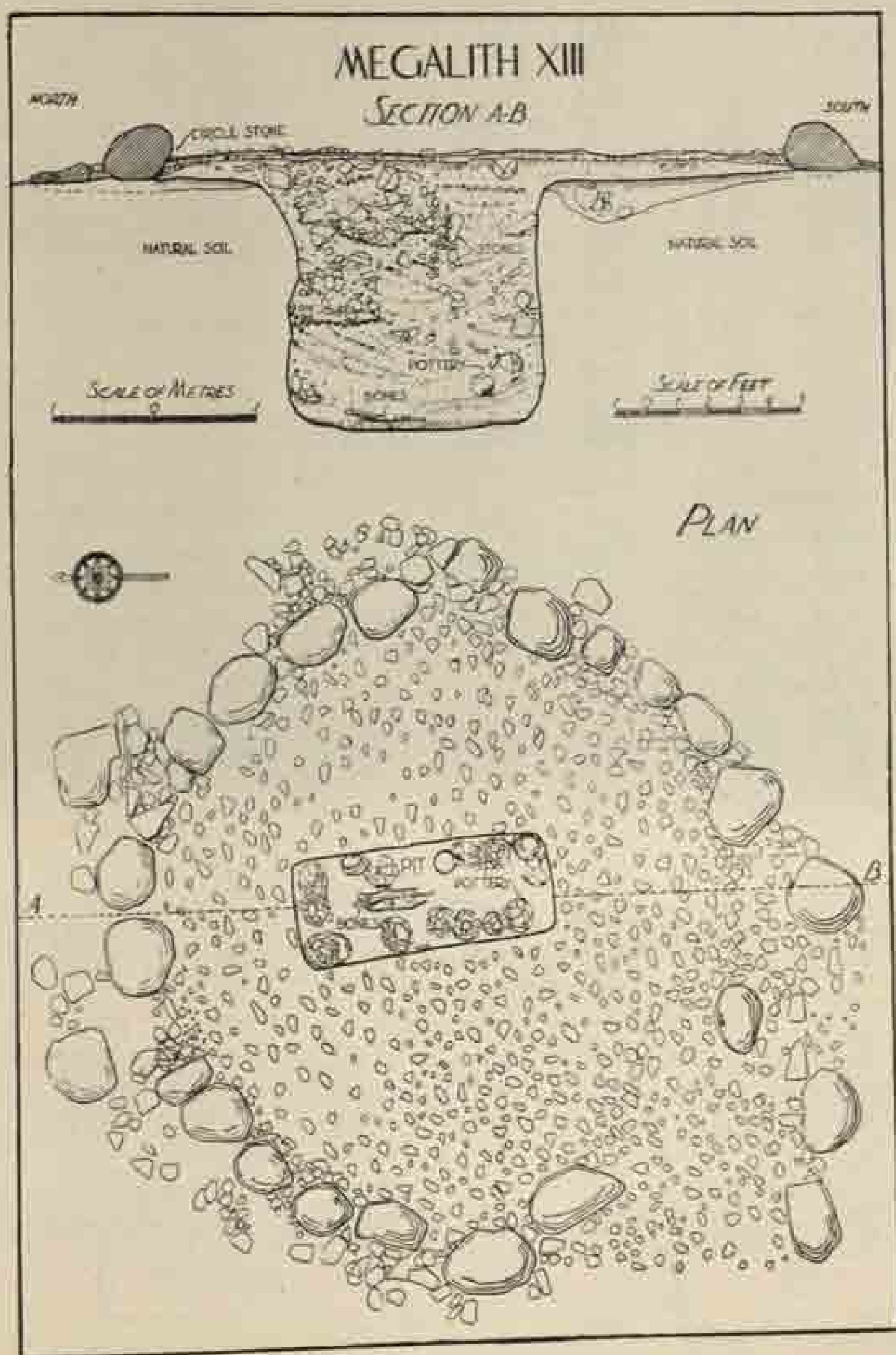


Fig. 83. Megalith XIII; Site No. 63. *See p. 178*

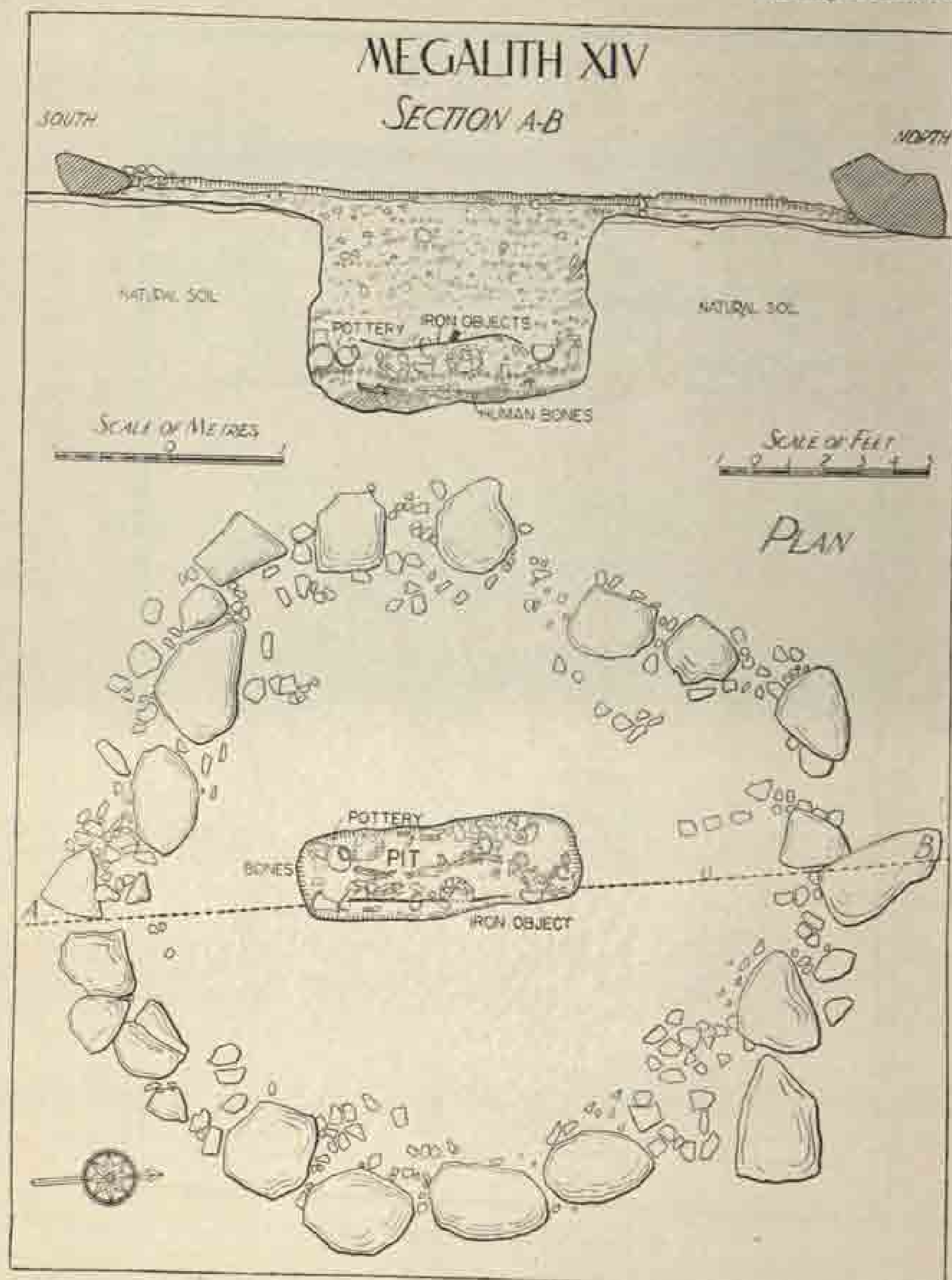


Fig. 84. Megalith XIV; Site No. 63. See p. 179

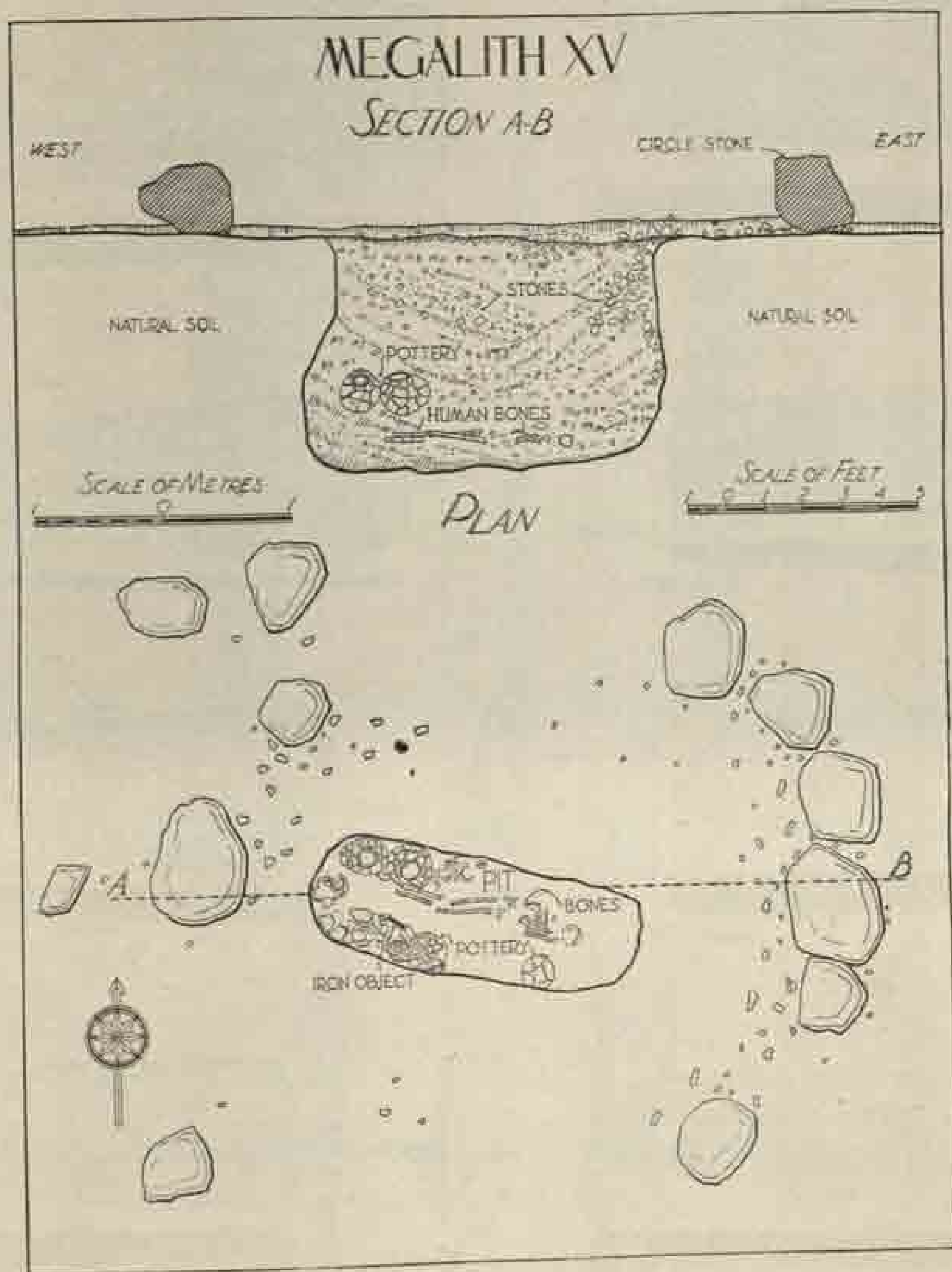


Fig. 85. Megalith XV: Site No. 63. See p. 100



1



2



3



4



5



9



6



7



10



8

0 3 6 9 12 15 CM.

0 1 2 3 4 5 6 IN.

Fig. 86. Megalithic iron implements. See p. 181

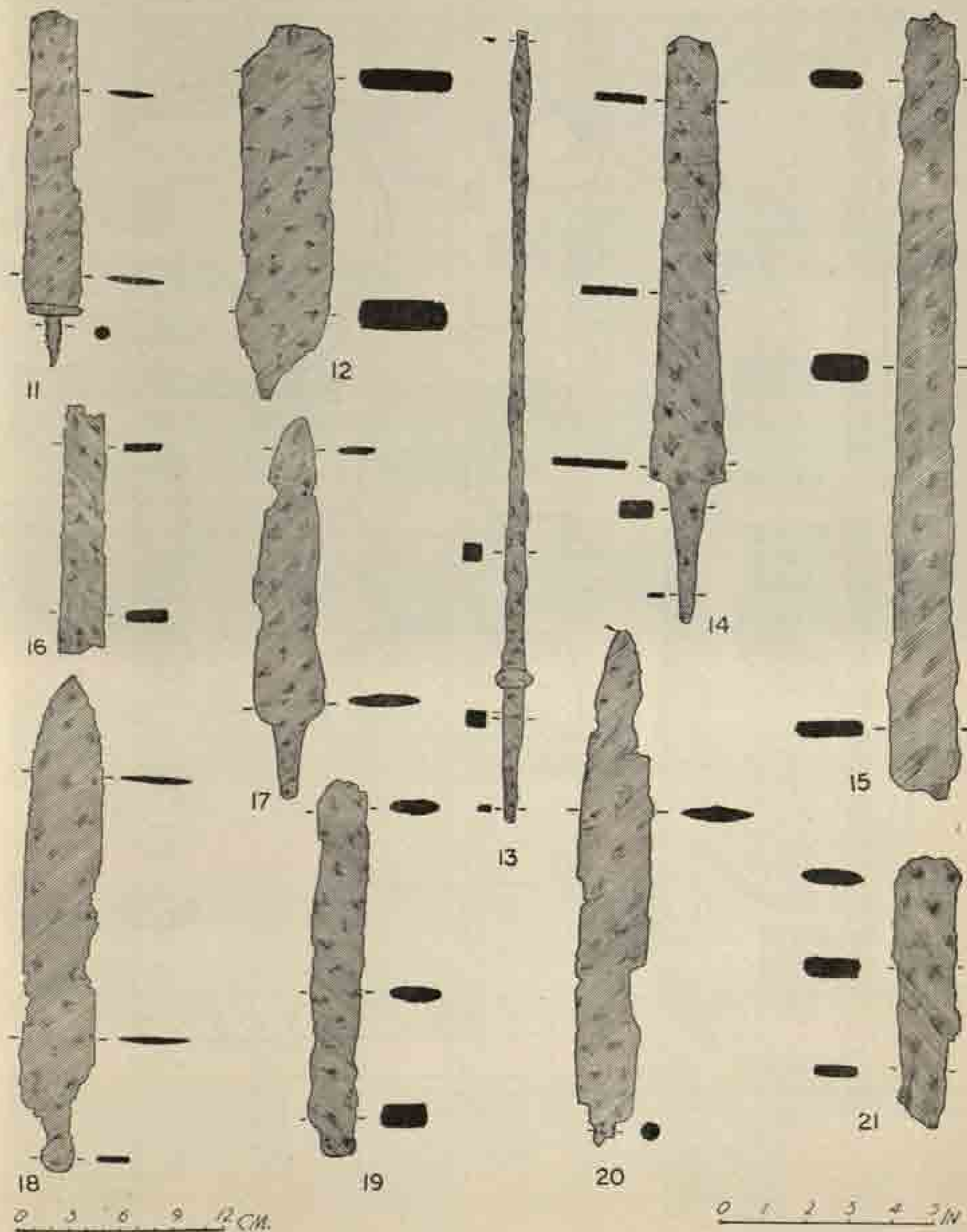


Fig. 87. Megalithic iron implements. See pp. 181 and 182

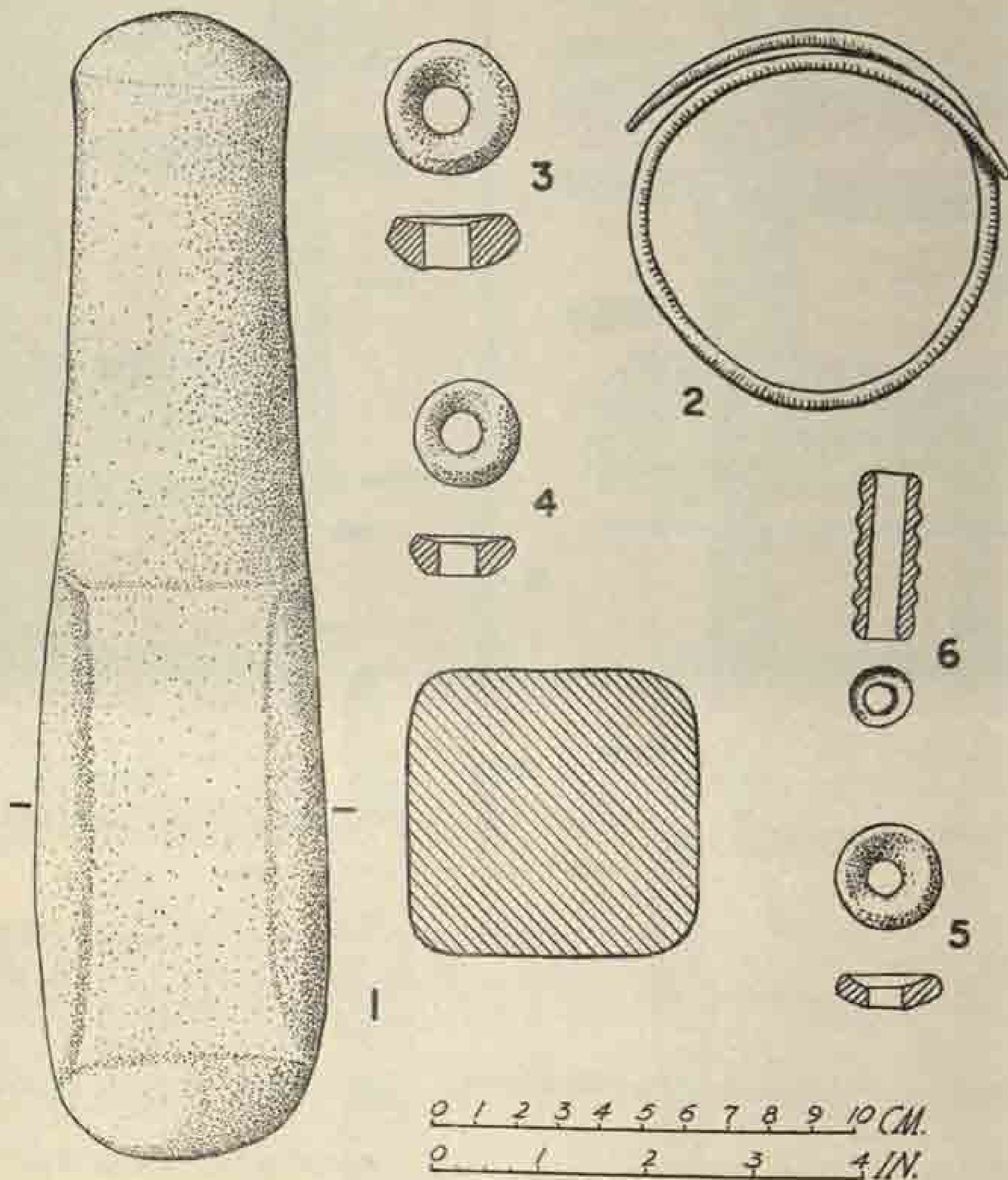


Fig. 88. Megalithic finds. See p. 182

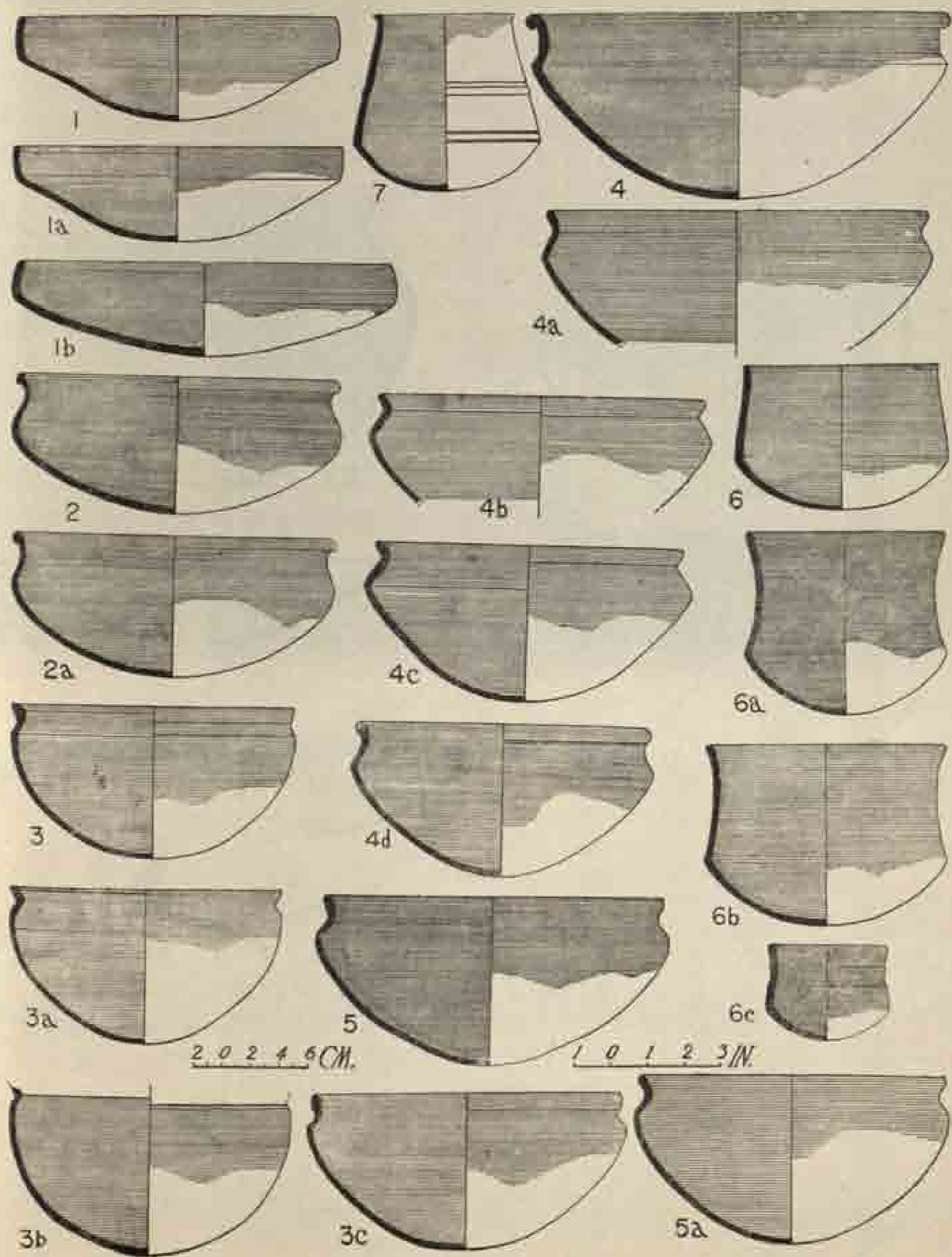


Fig. 89. Megalithic pottery types. See pp. 196–198

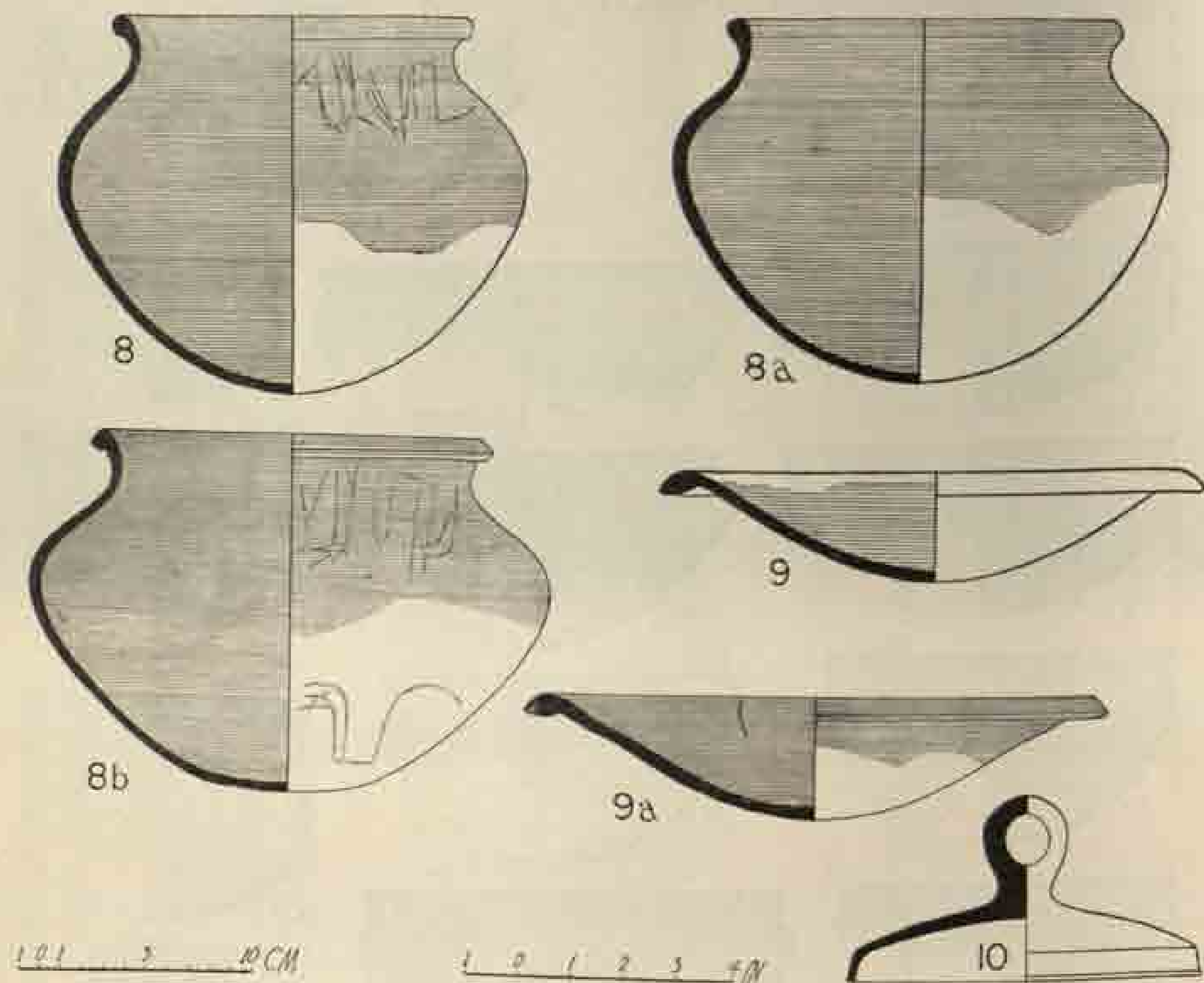


Fig. 90. Megalithic pottery types. See pp. 198 and 201

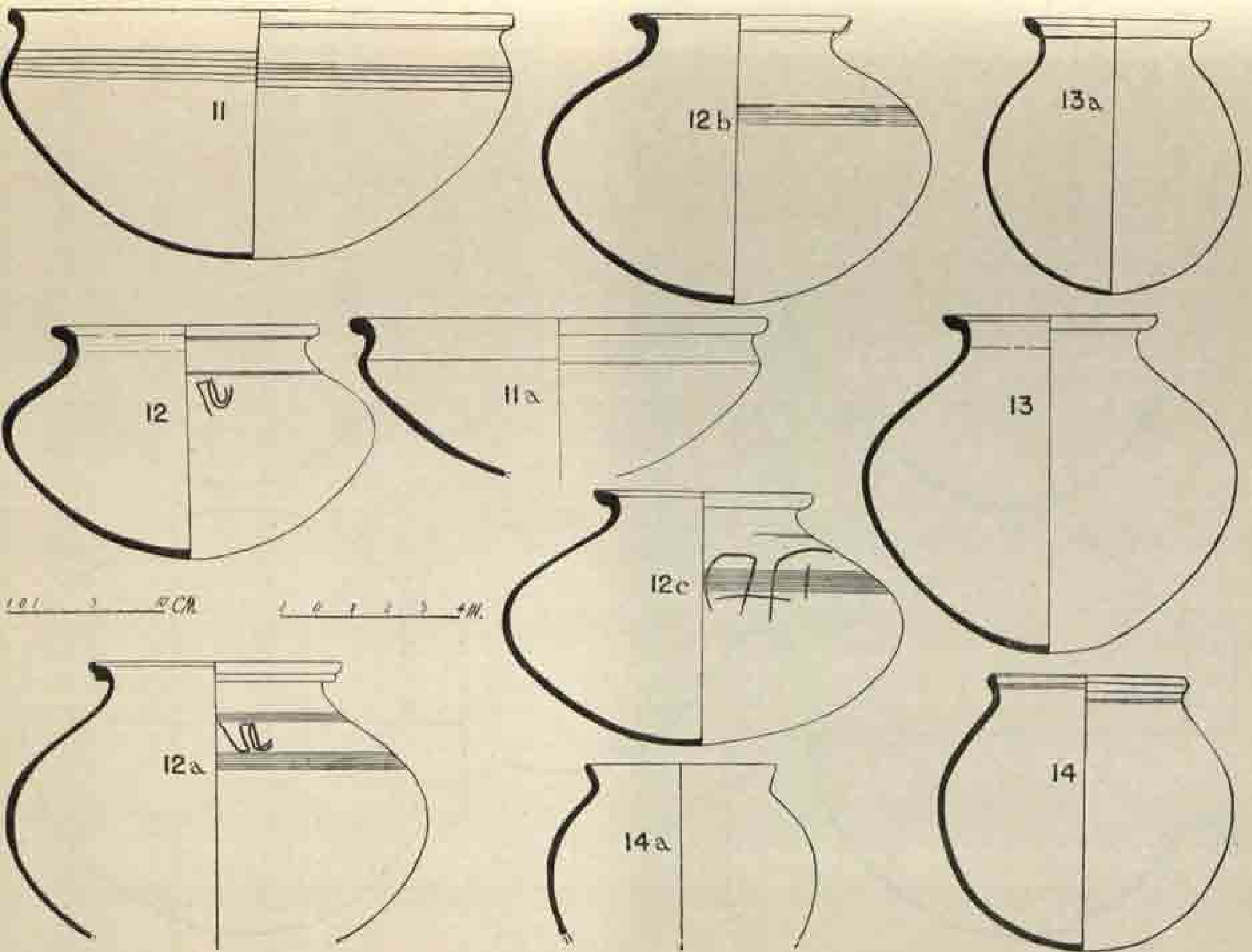


Fig. 91. Megalithic pottery types. See p. 199

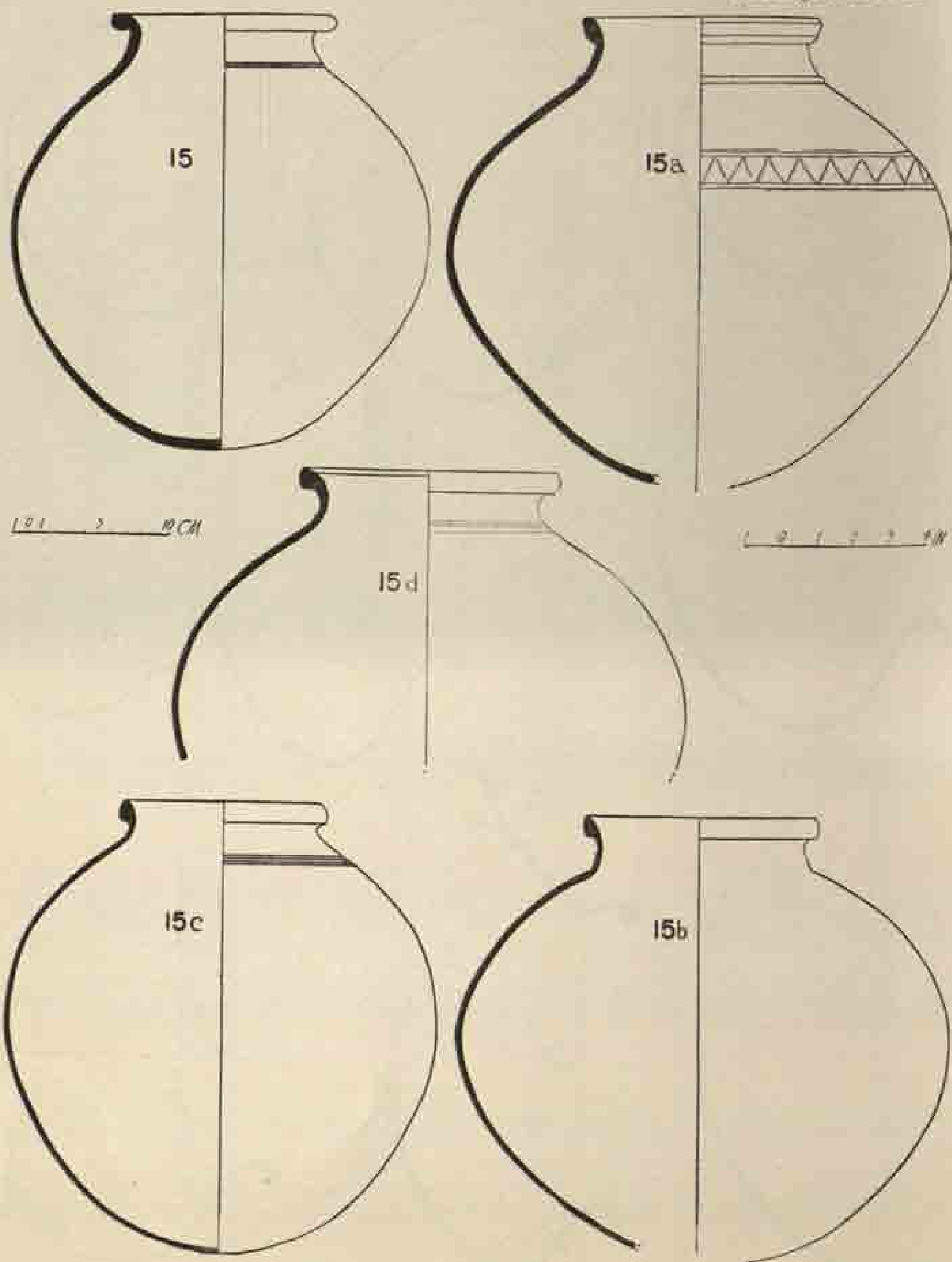


Fig. 92. Megalithic pottery types. See pp. 193 and 200

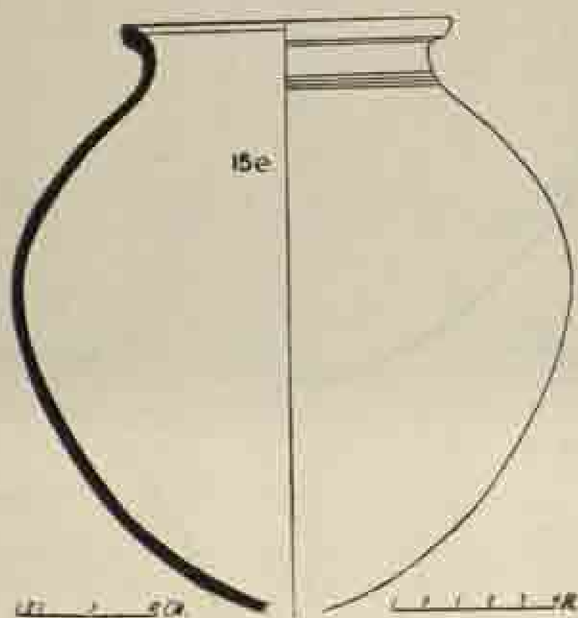


Fig. 93. Megalithic pot. *See p. 200*

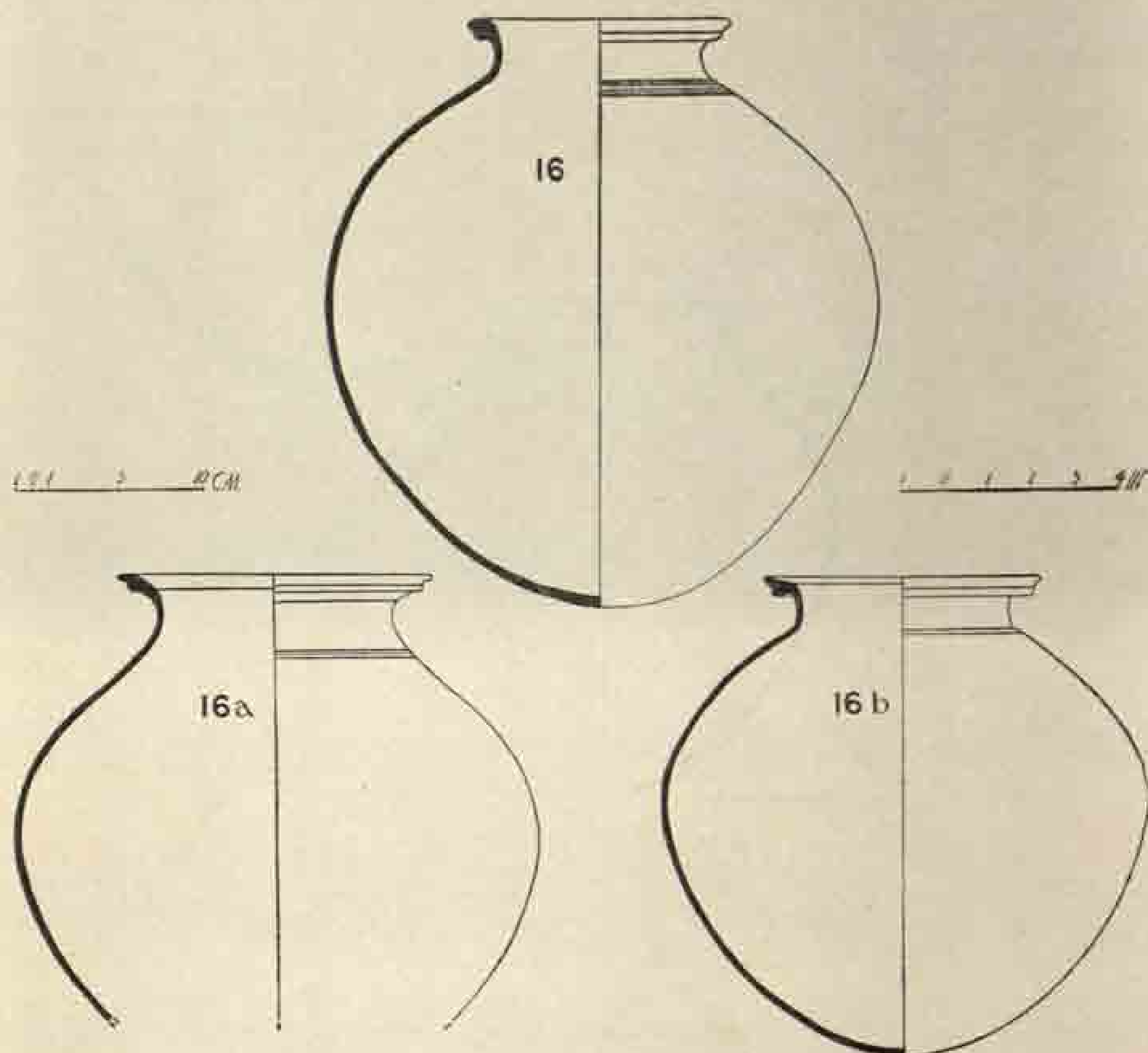


Fig. 94. Megalithic pottery types. See p. 200

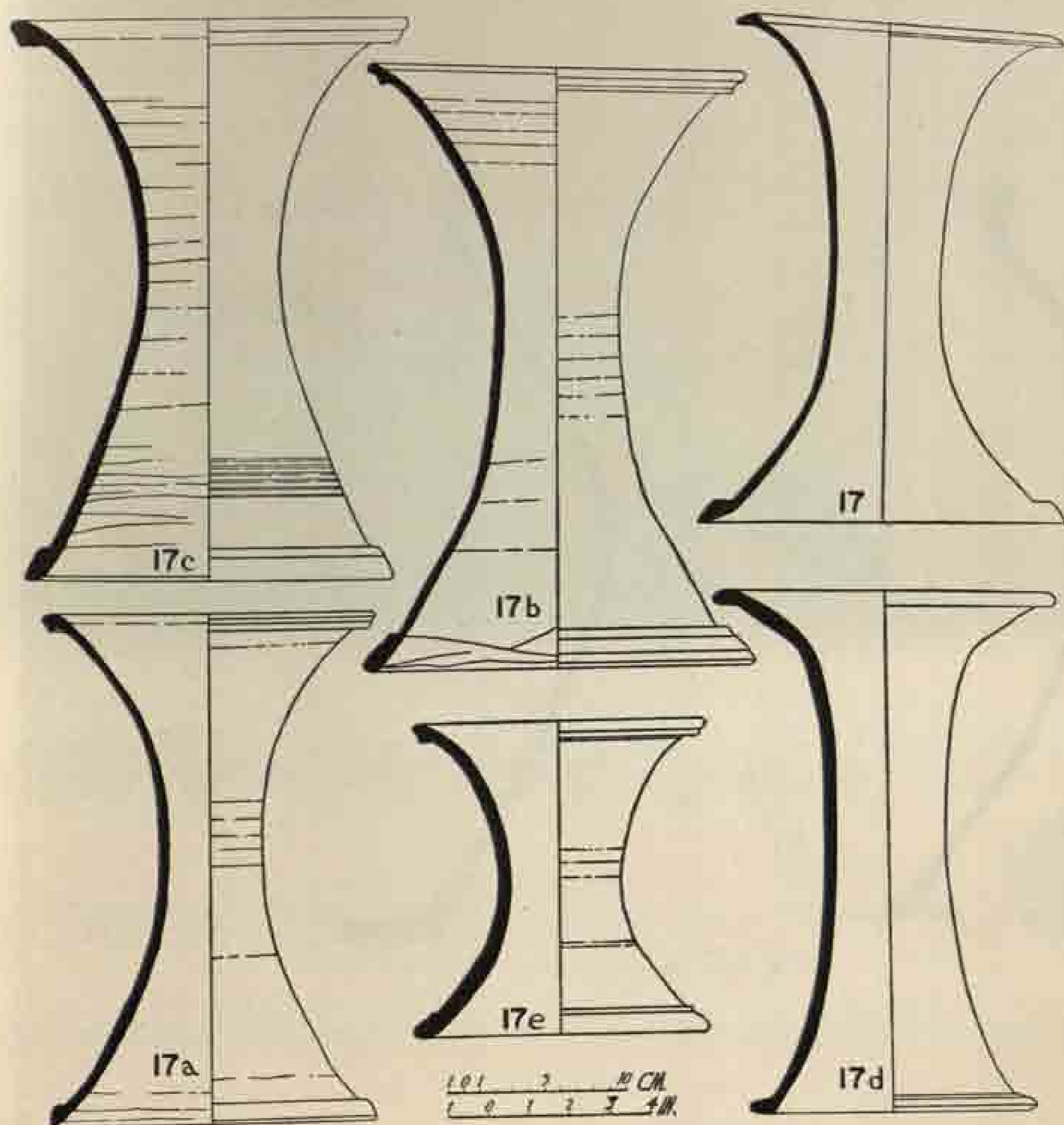


Fig. 95. Megalithic ring Stands. See p. 200

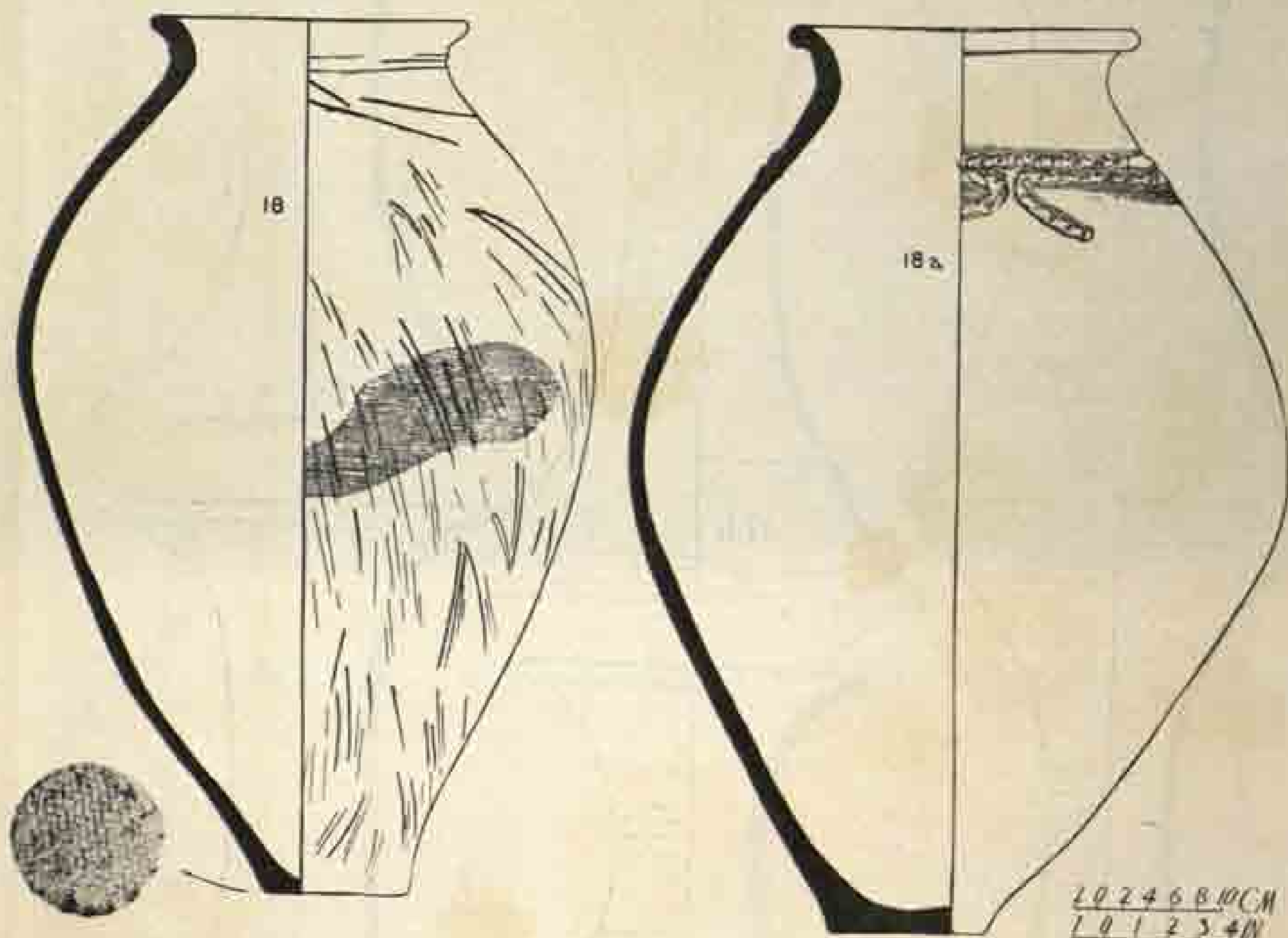
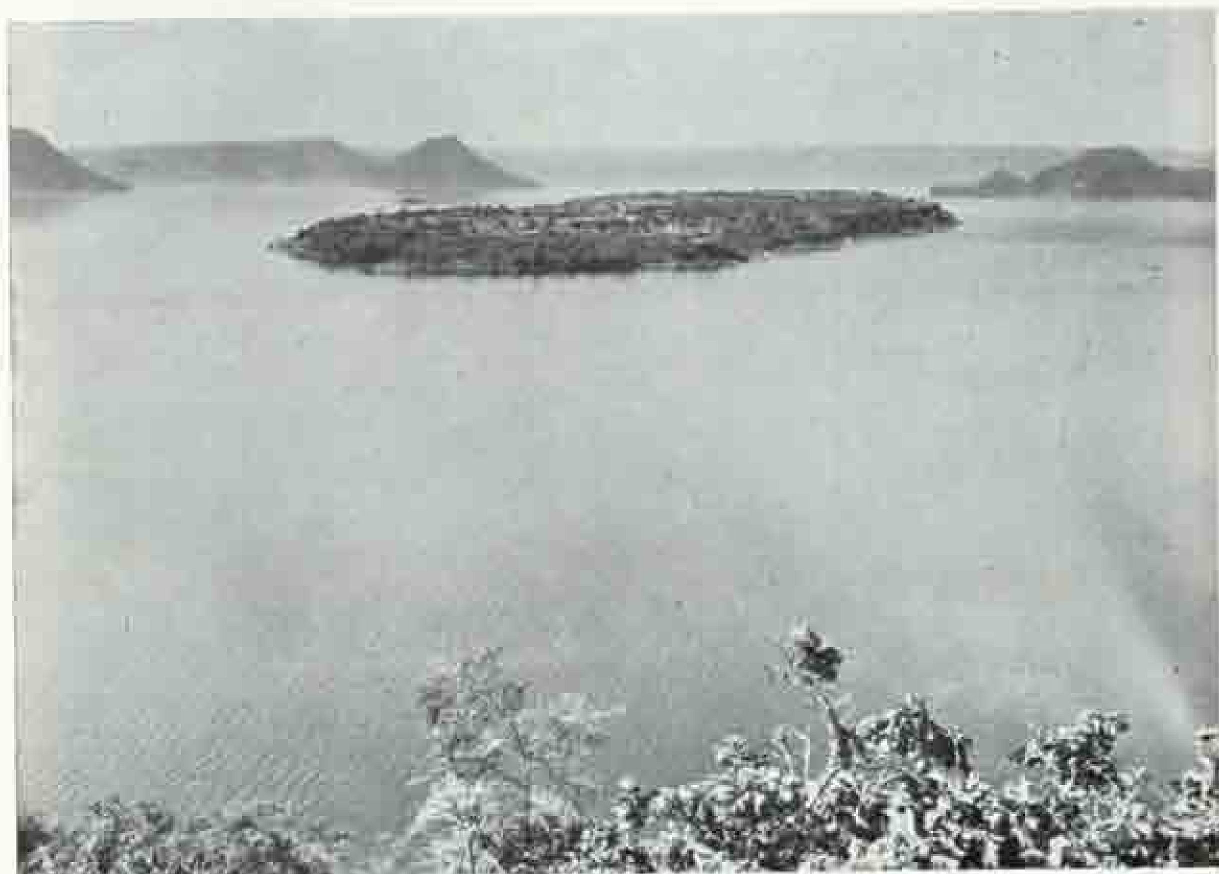


Fig. 96. Megalithic urn type jars. *See p. 200*



Panoramic View of Nagarjunakonda Valley, taken from south-east corner of the hill before submergence. *See p. xx.*

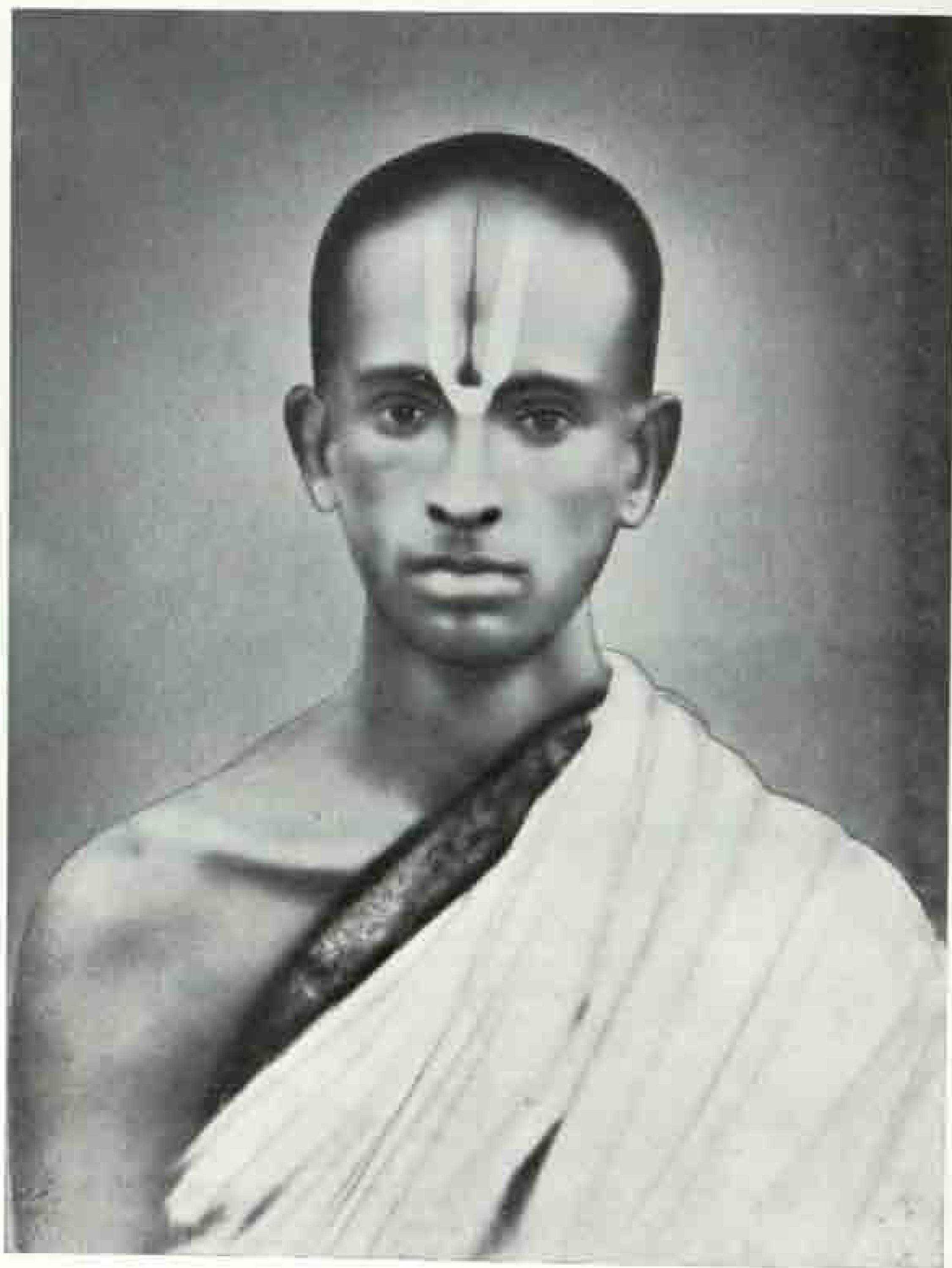


A

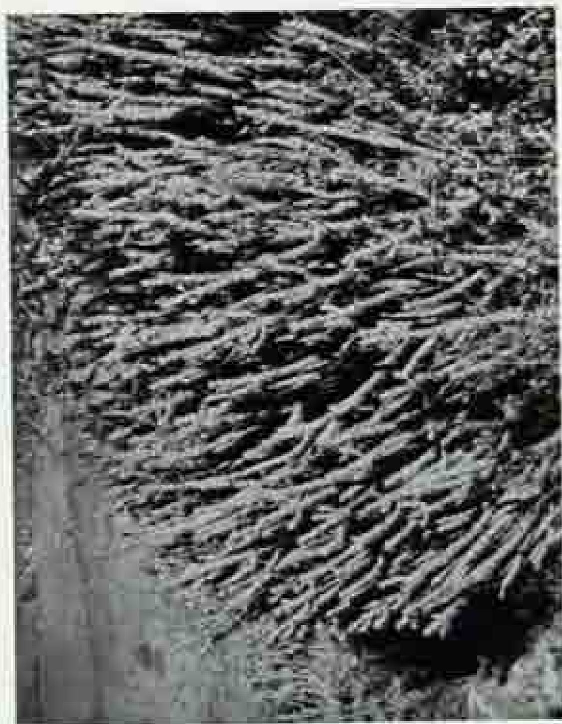


B

A, *Nagarjunakonda island in the Nagarjunasagar reservoir;* B, *Island Museum.* *See p. xv*



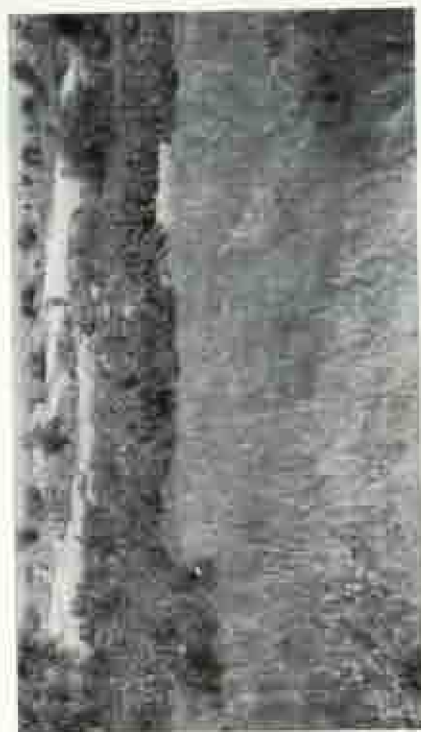
Rangaswamy Saraswati. *See p. xviii*



C



A



B

A. *A population of Celosia argentia* Linn.; B. *General view of the valley showing the type of vegetation found*; C. *Euphorbia nivulia* Buch-Ham, *a typical xerophytic thorny shrub found in shrub jungle.* *See pp.* 2 *and* 3



A

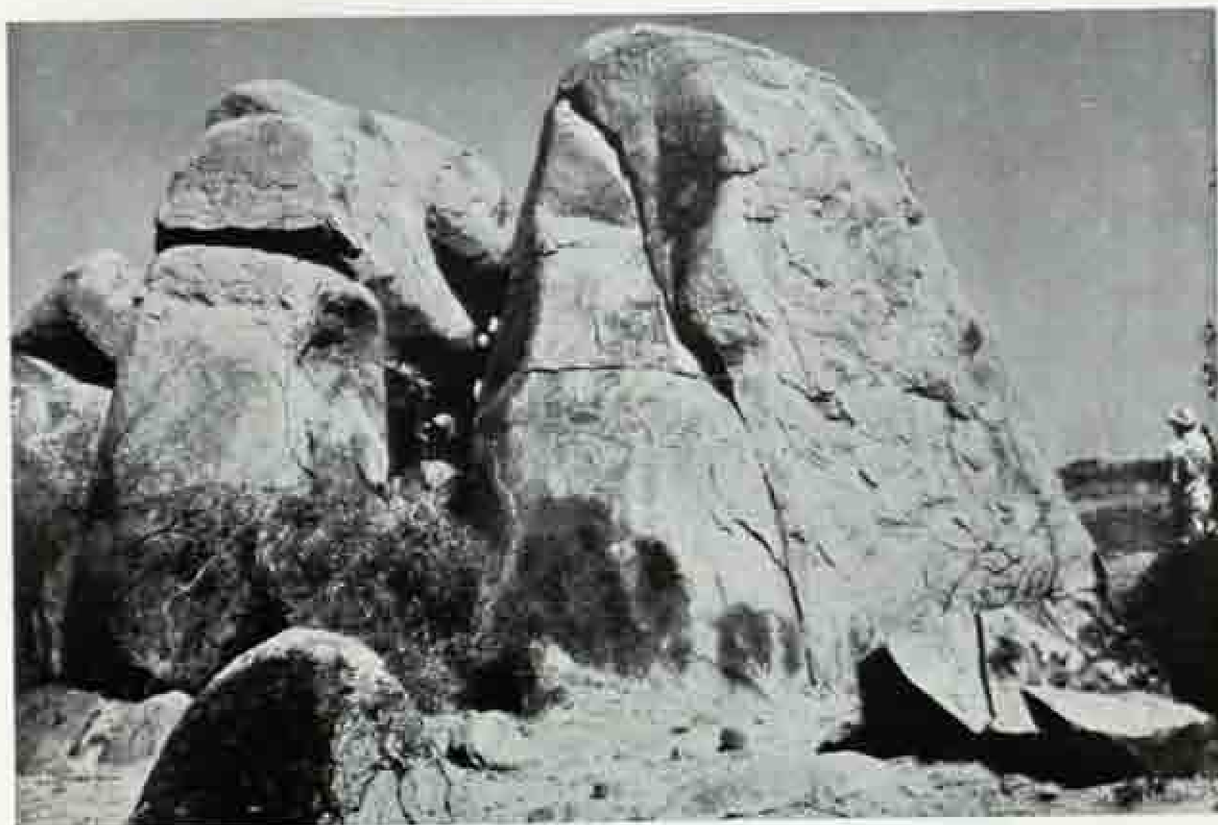


B



C

A, *Acacia latronum wild, a shrubby tree noted for its large white spines in pairs;* B, *Shrub-jungle on the slopes of Nallamalai hills;* C, *A population of Pavonia odorata wild on the slopes of the hills.* *See p. 3*

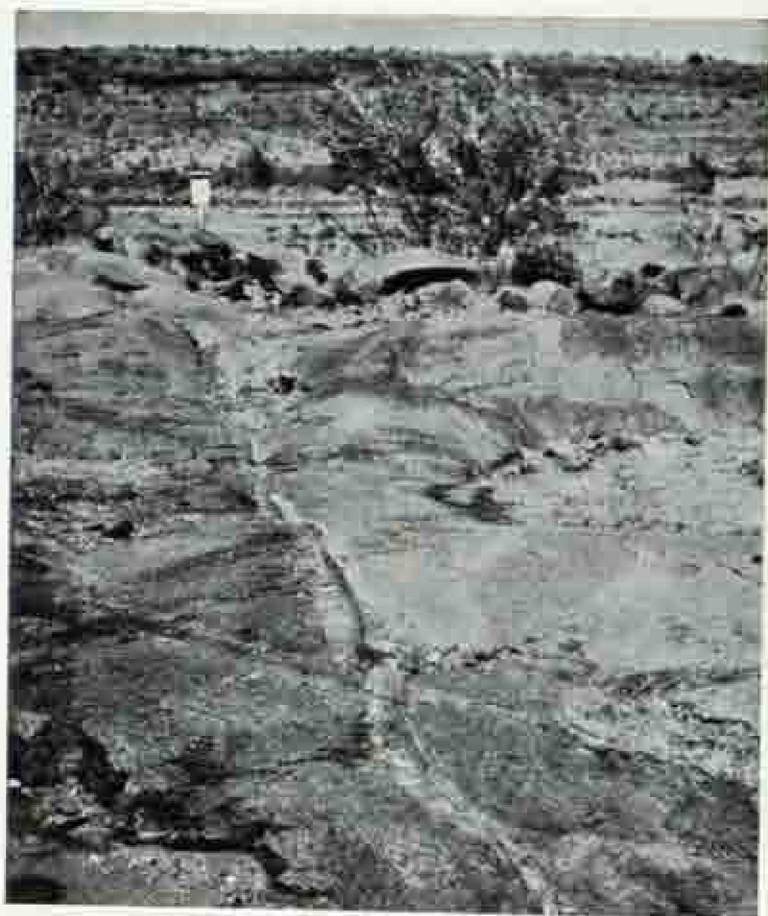


A

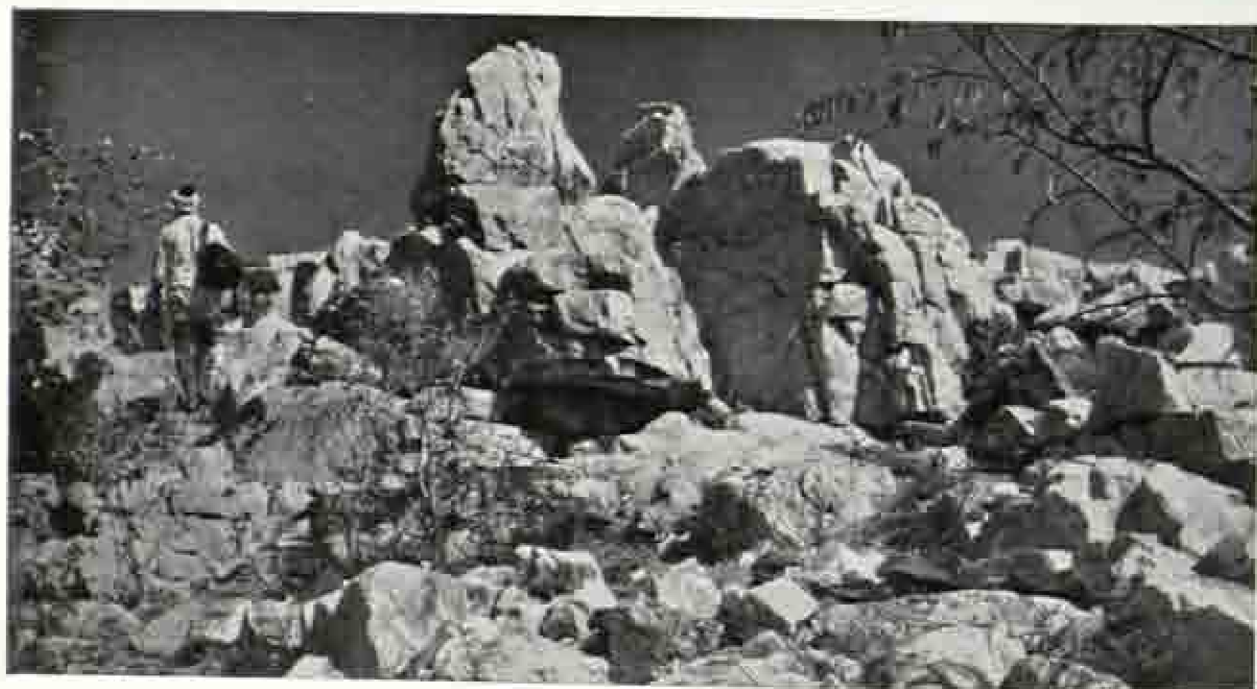


B

A, *Granitors showing joints and spheroidal weathering;* B, *Outcrops of granite-gneiss crossed with joints.* *See p. 8*



A

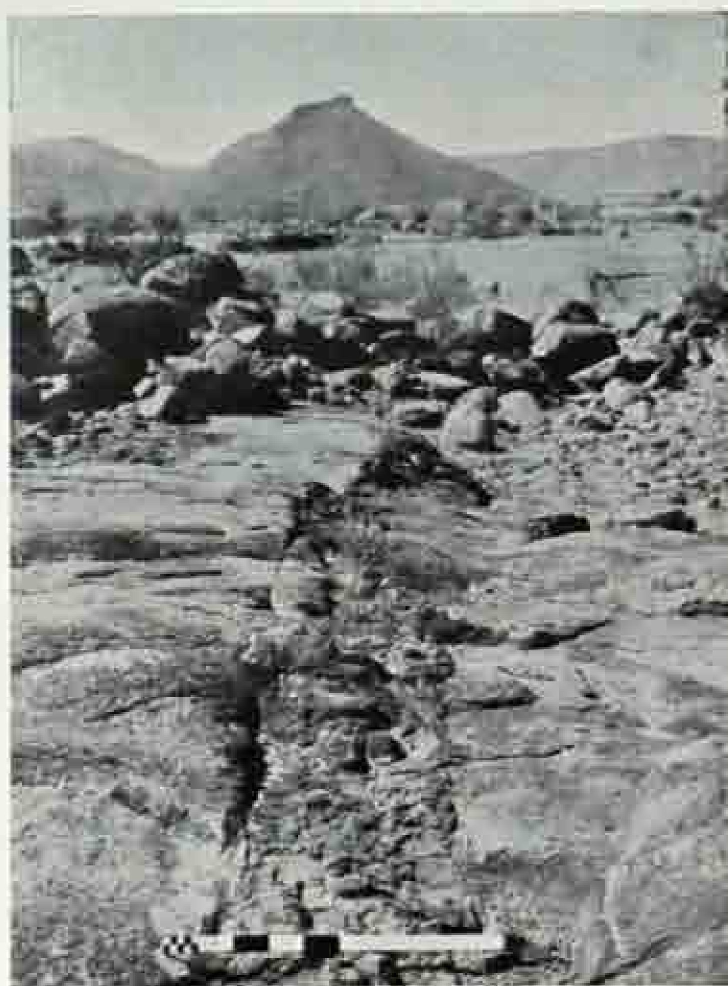


B

A, *Pegmatite veins in granite-gneiss*; B, *quartz reef*. *See p. 9*

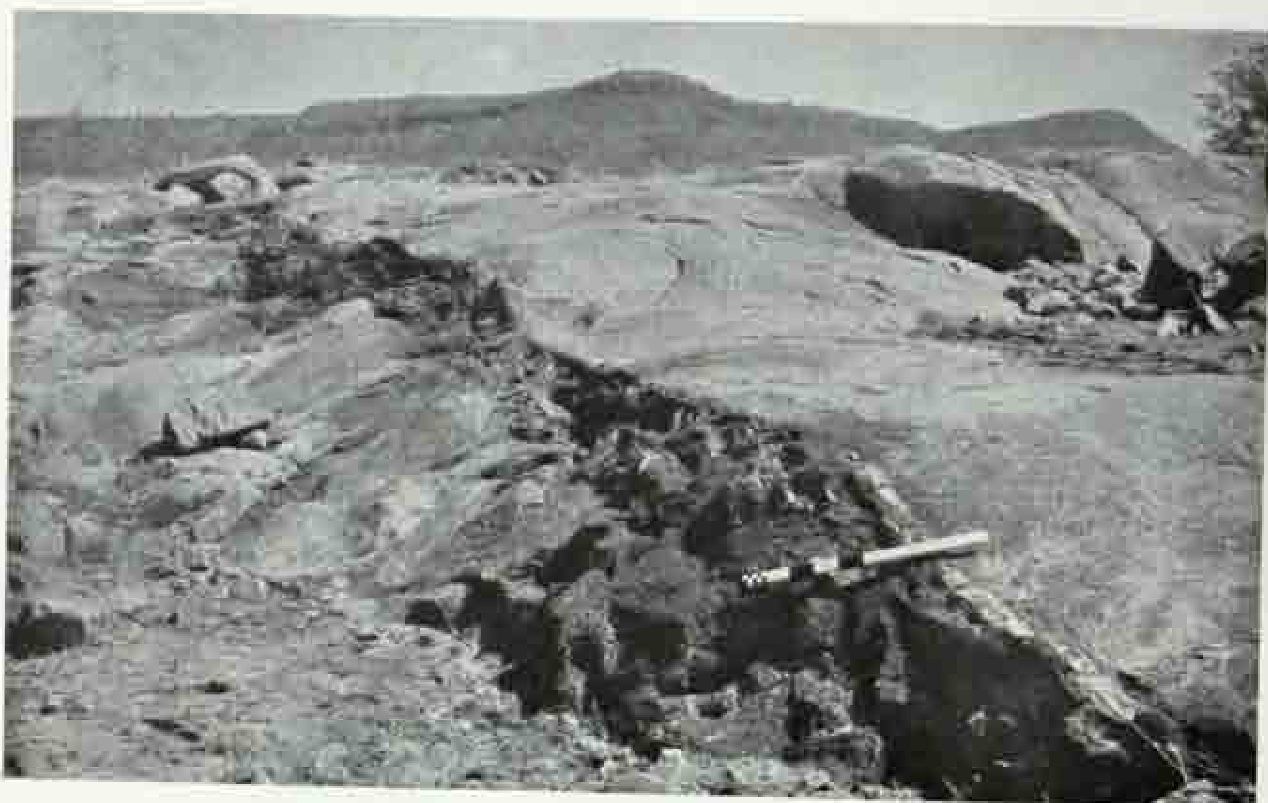


A

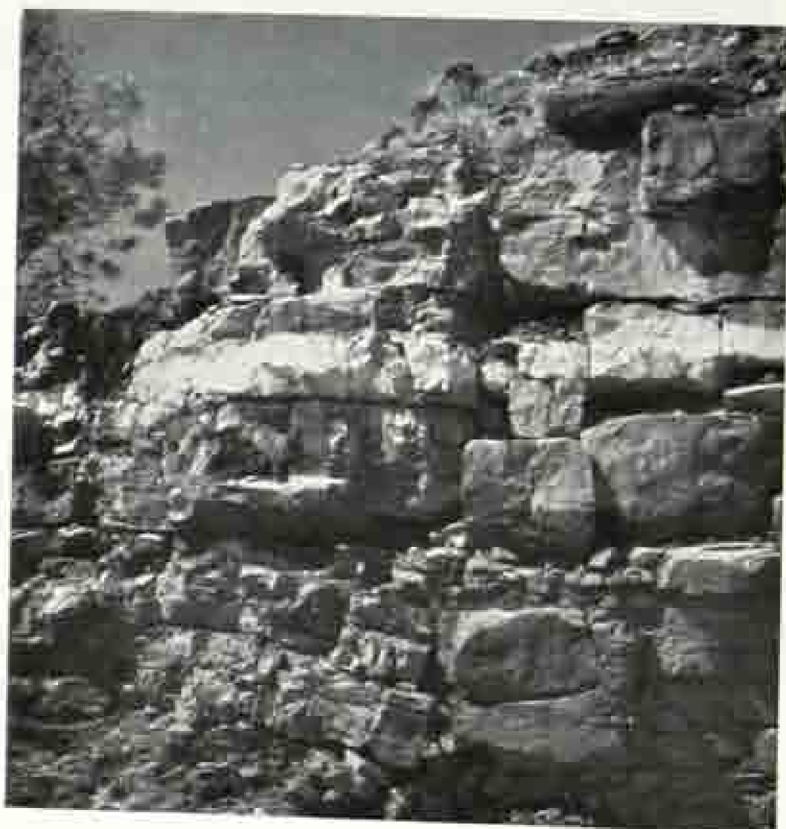


B

A, *Quartz reef*; B, *Dolerite dyke in granite-gneiss.* *See p. 9*

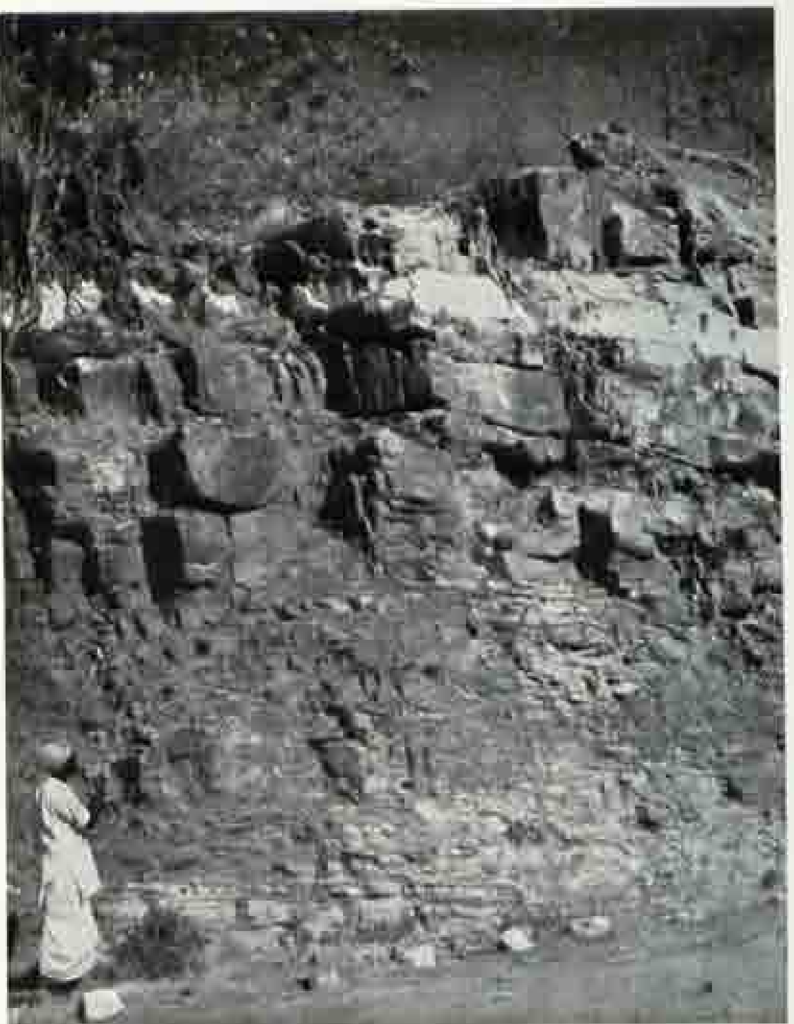


A

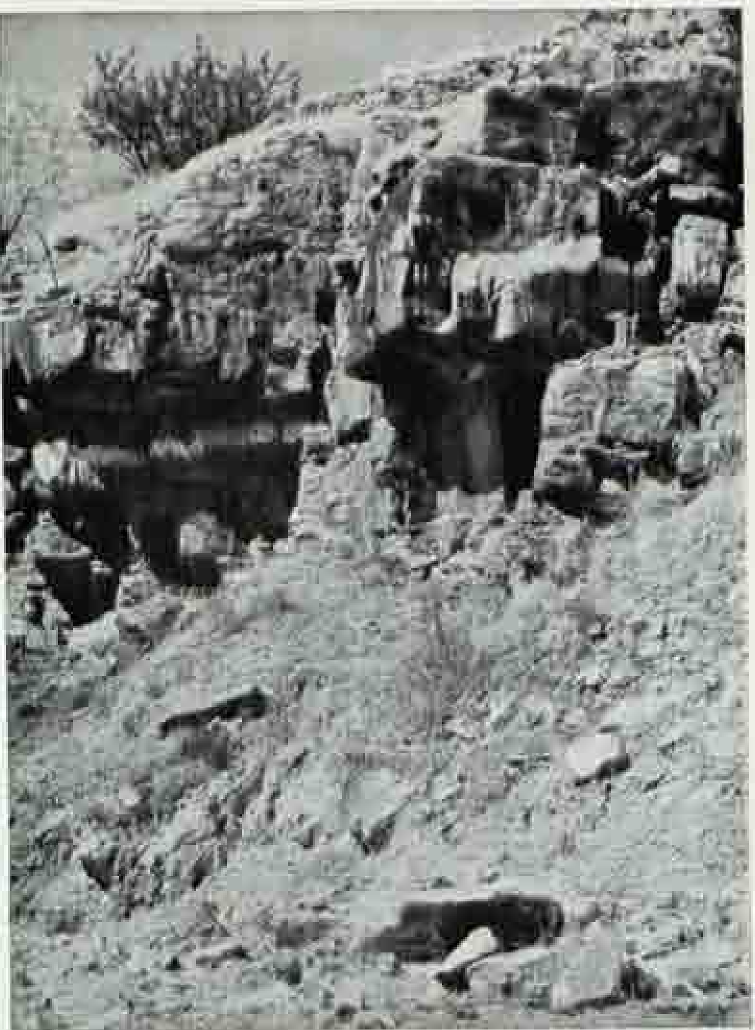


B

A, *Dolerite dyke in granite-gneiss*; B, *Jointed quartzite and underlying sandy shales.* *See pp. 9 and 10*



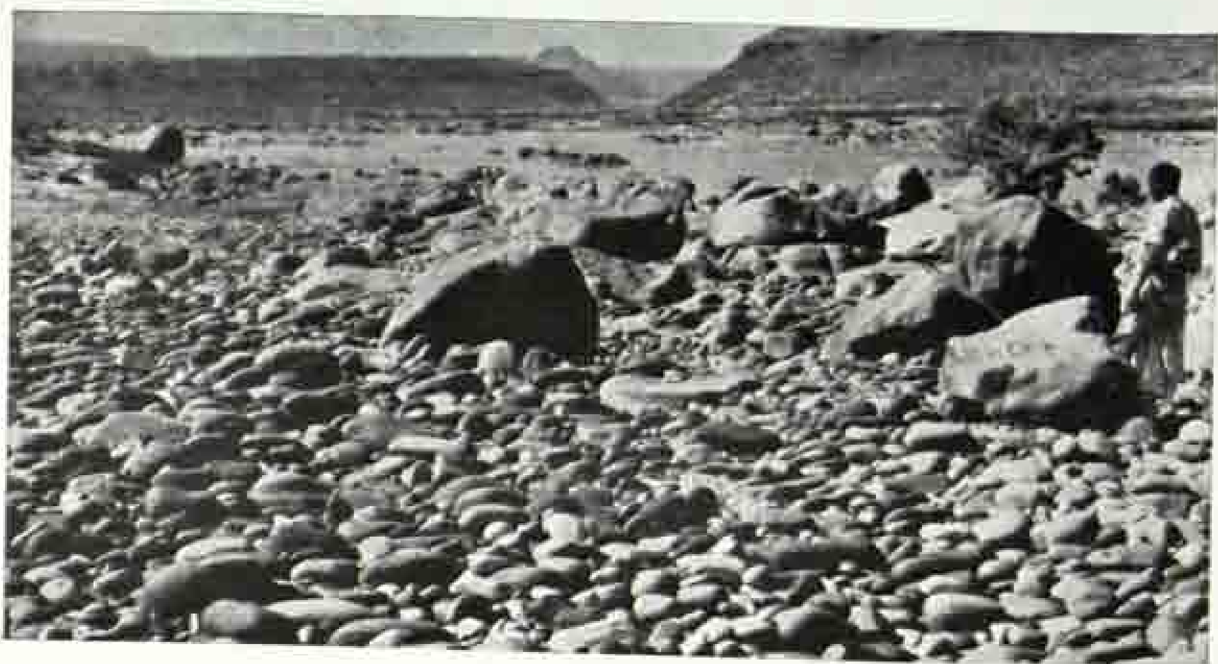
A



B

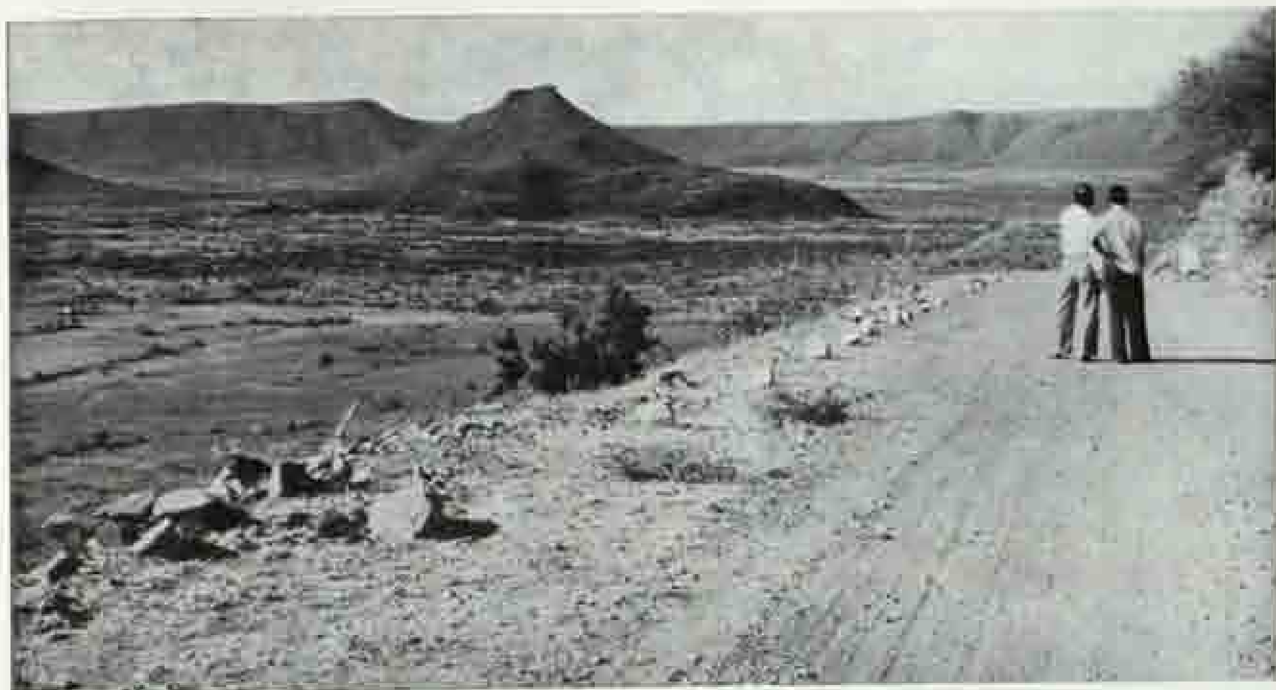
A. *Jointed quartzite and underlying sandy shales;* B. *foundation of rock shelters in quartzite.* *See p. 10*

A

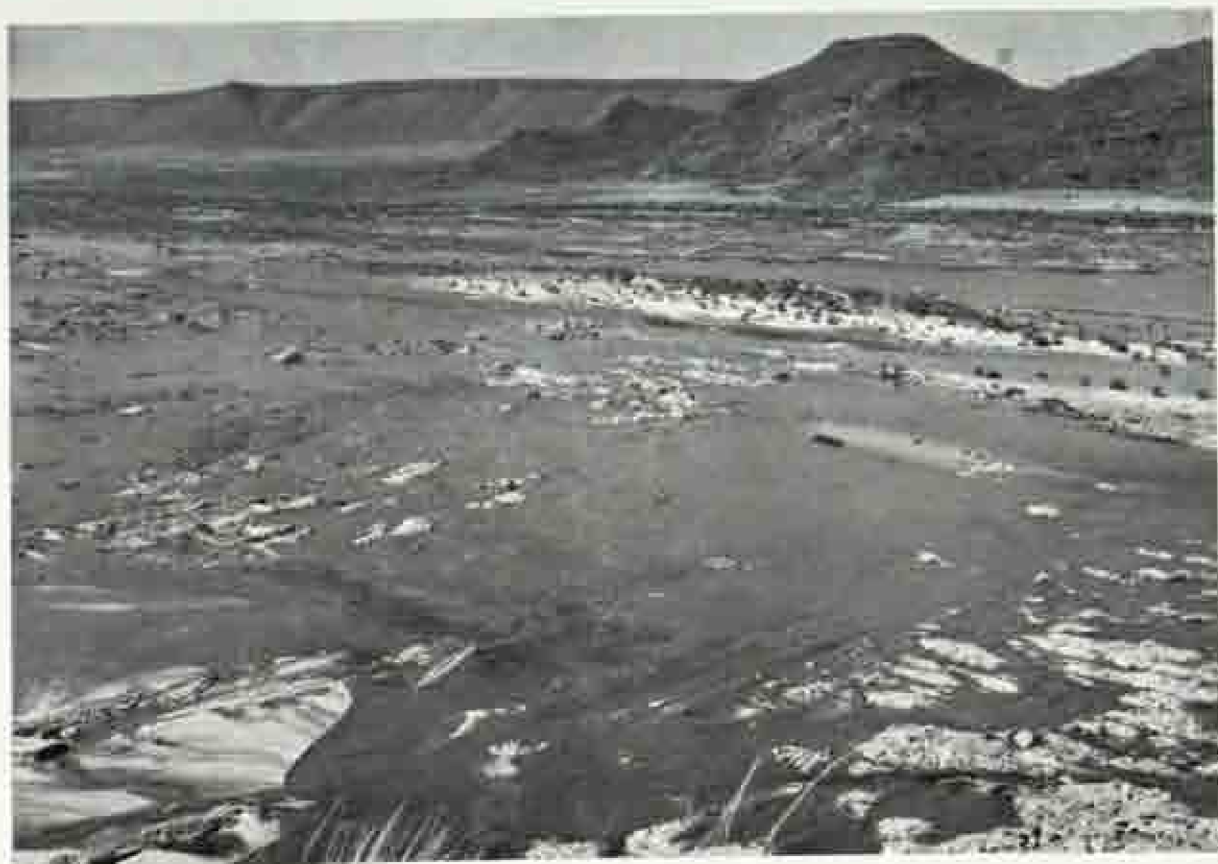


B

A, *Laterite type of honeycombs, weathering of quartzite. The boulder in the background is completely lateritized;* B, *Boulders and pebble-spread on the right bank of the river Krishna, down stream.* *See p. 10*



A



B

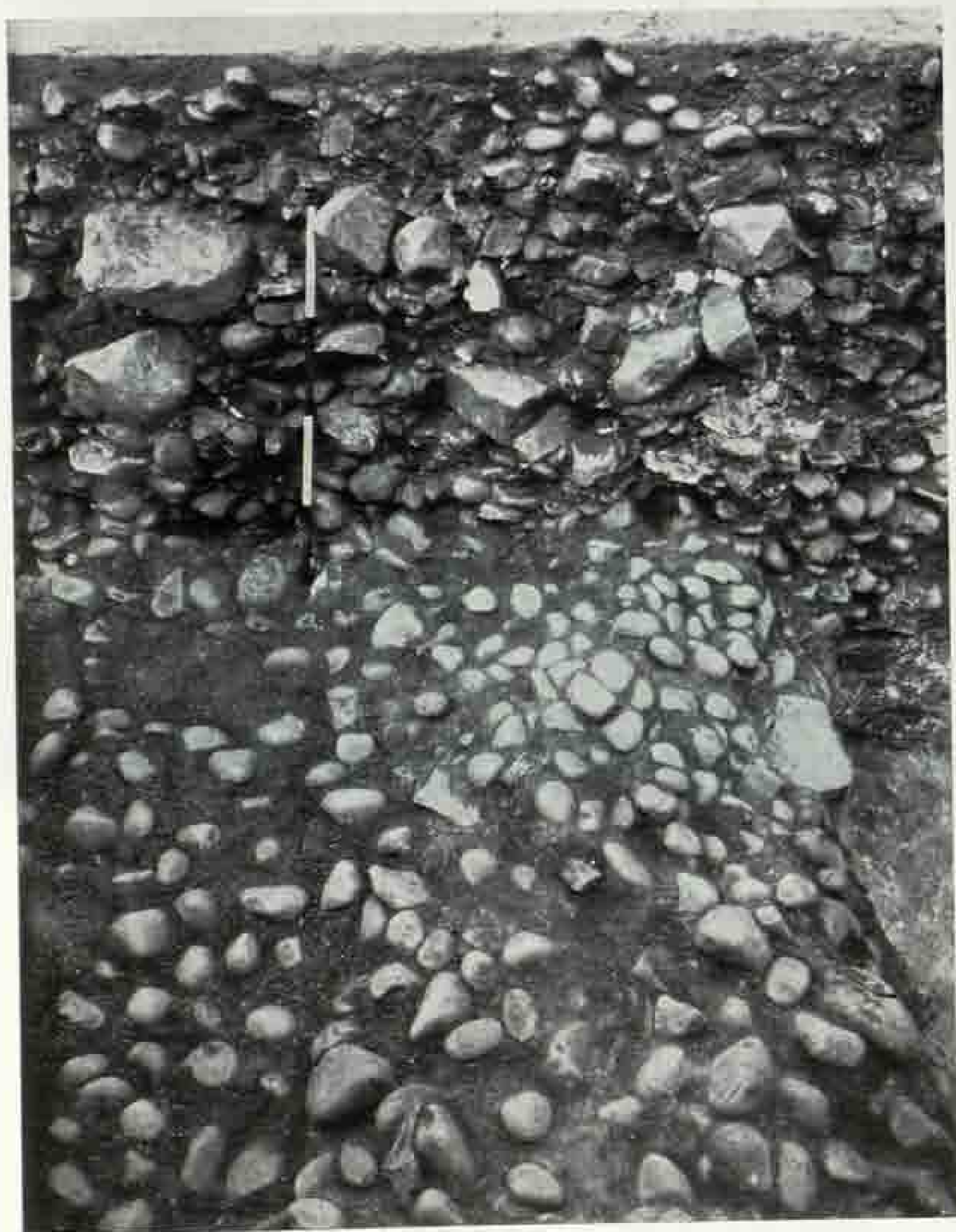
A, *General view of Nagarjunakonda valley from the island hill;* B, *River Krishna at Nagarjunakonda.* *See p. 11*



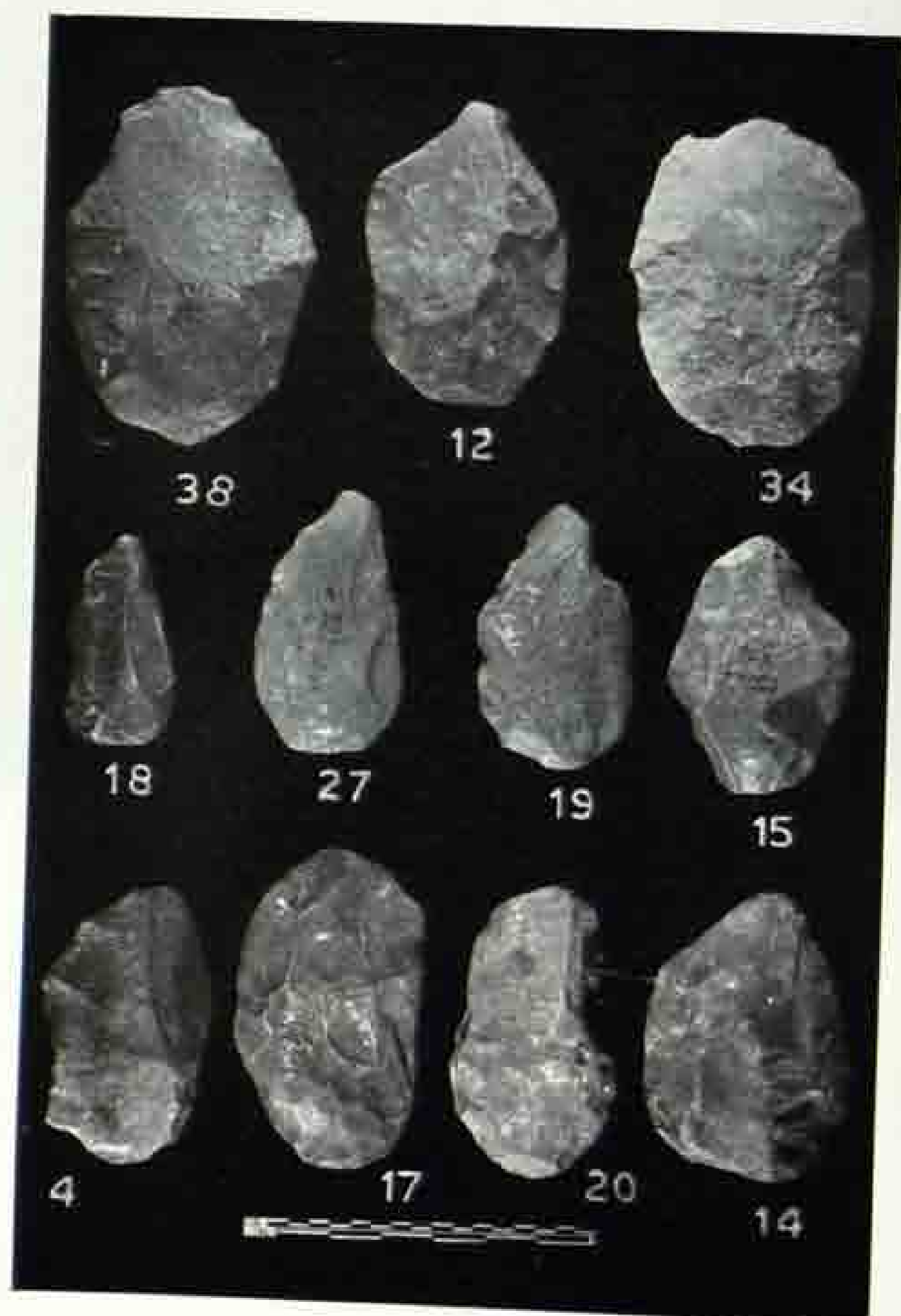
A

B

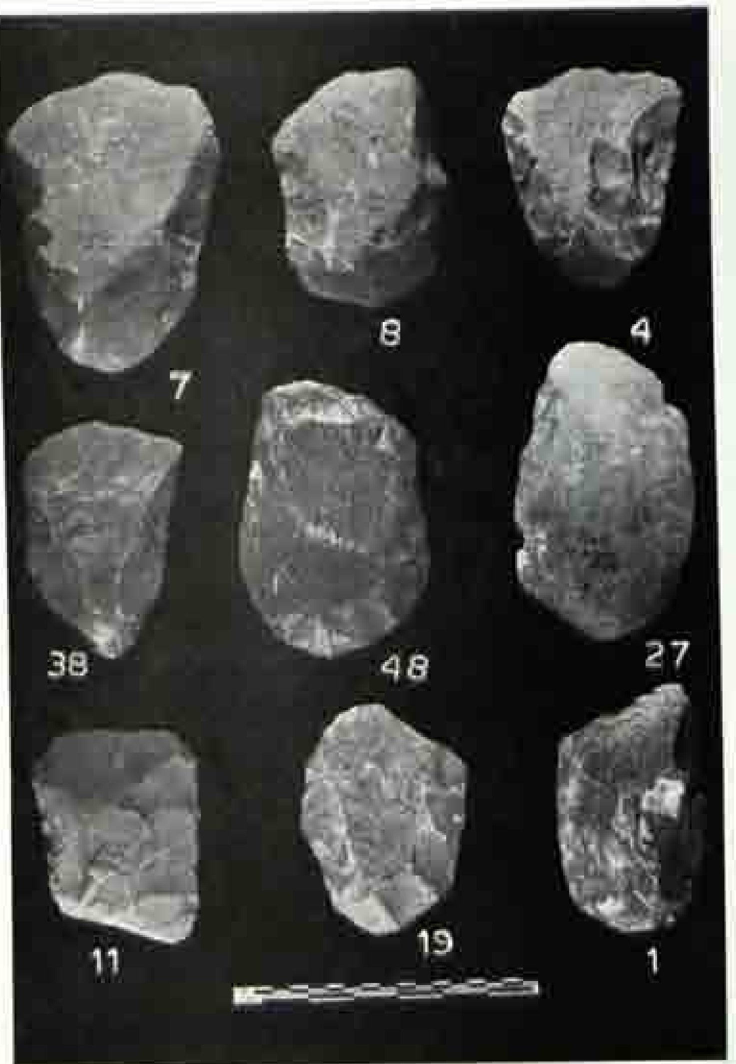
Site No. 128, Trench No. 3: A, General view before excavation; B, Section showing the pebble-bed in the foreground. See pp. 23 and 24



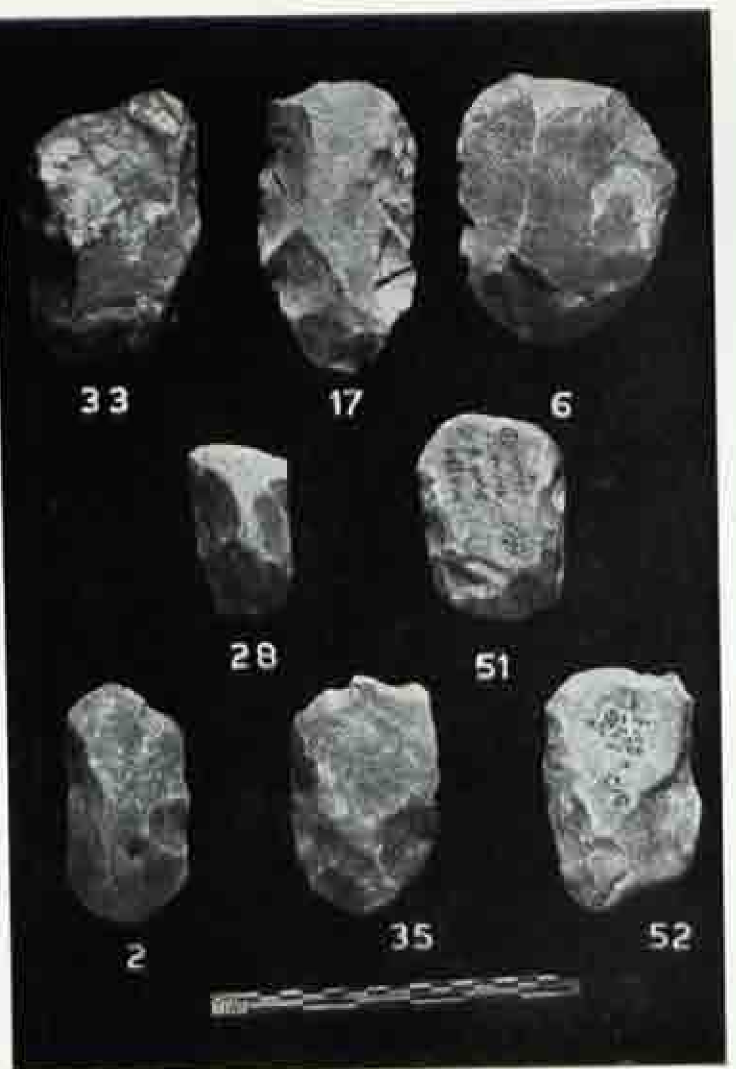
Section 3, Trench 2, Site No. 128. *See p. 24*



Hand axes. See p. 26

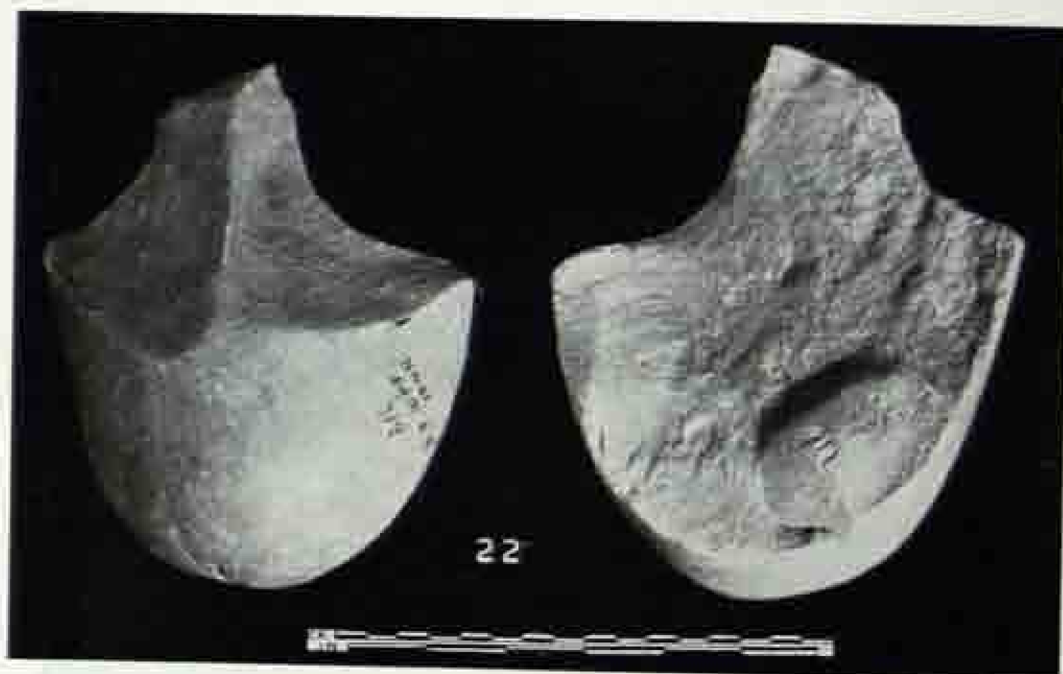


A



B

Cleavers. *See p. 3*

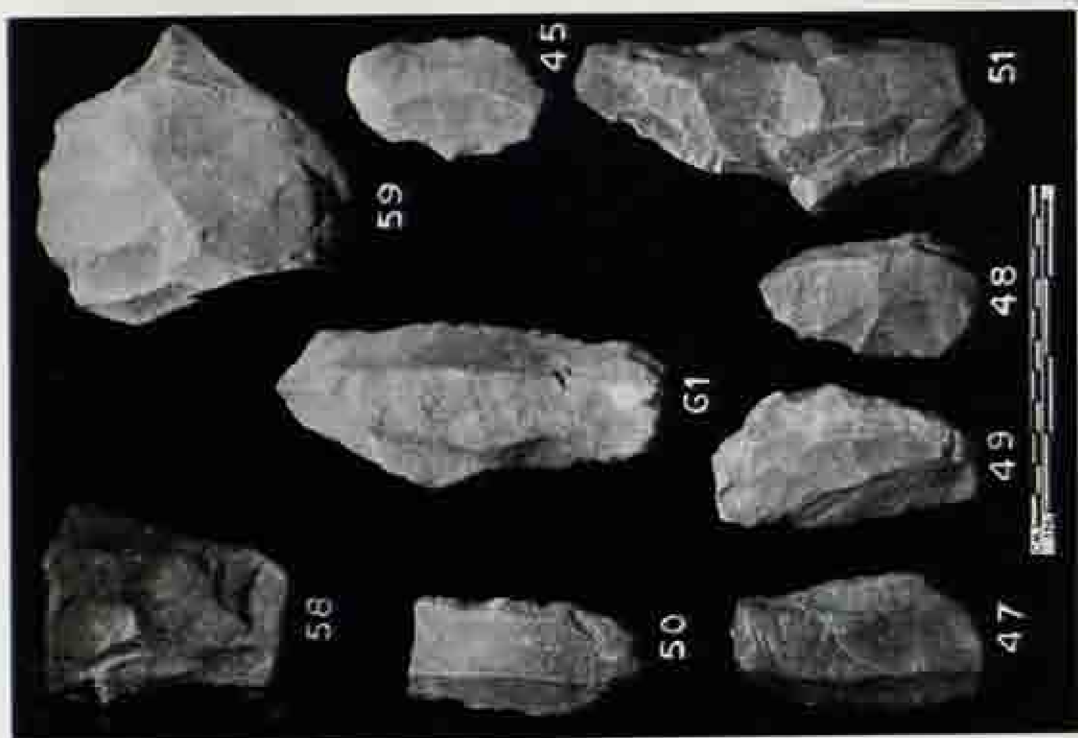


A

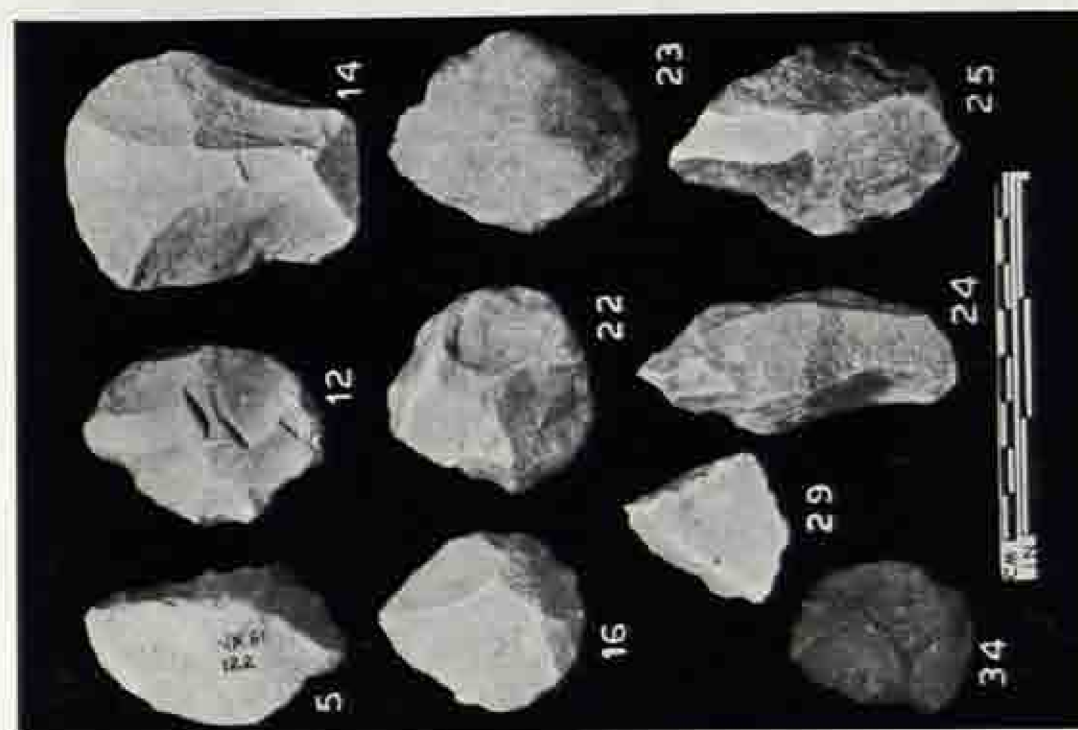


B

A, *Chopper (beaked tool)*; B, *Hand axes*. *See pp. 35 and 40*



B



A

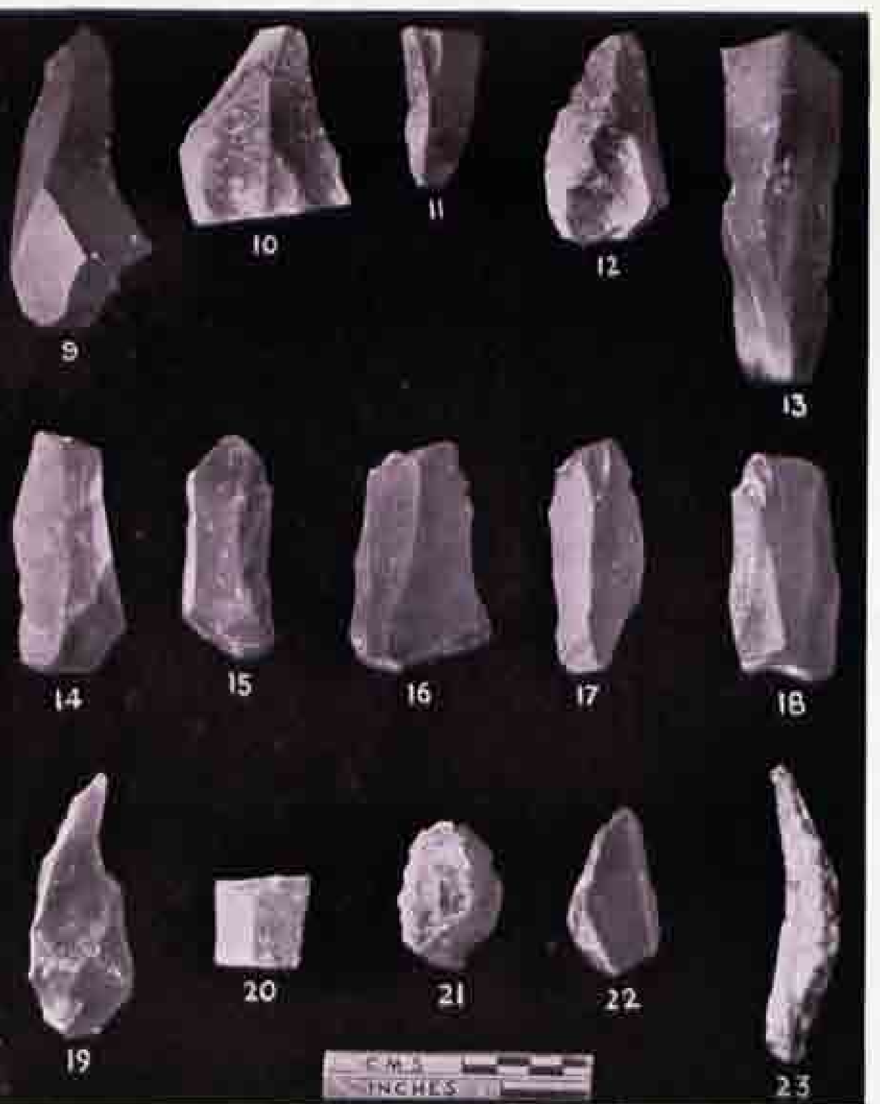
Middle Stone Age tools: A, *Scrapers, flakes etc.;* B, *Blades, cores etc.* *See p. 45*



General view during excavation, Site No. 45-A. *See p. 48*

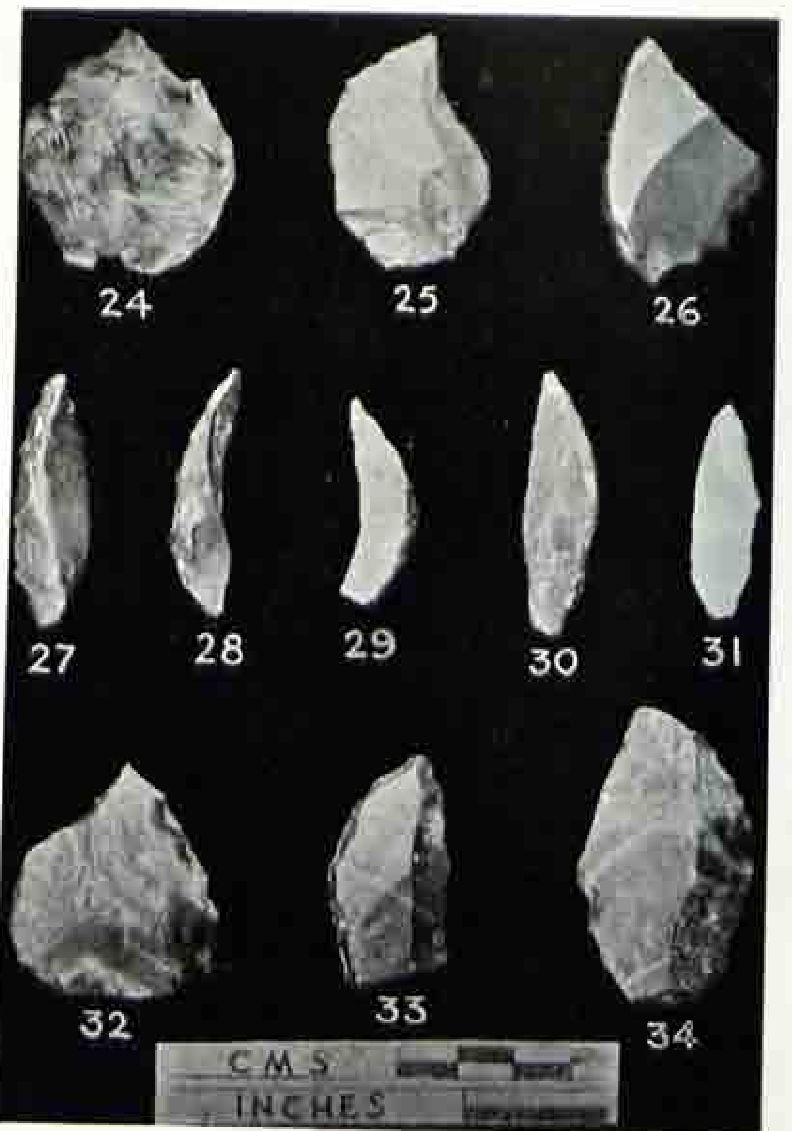


A

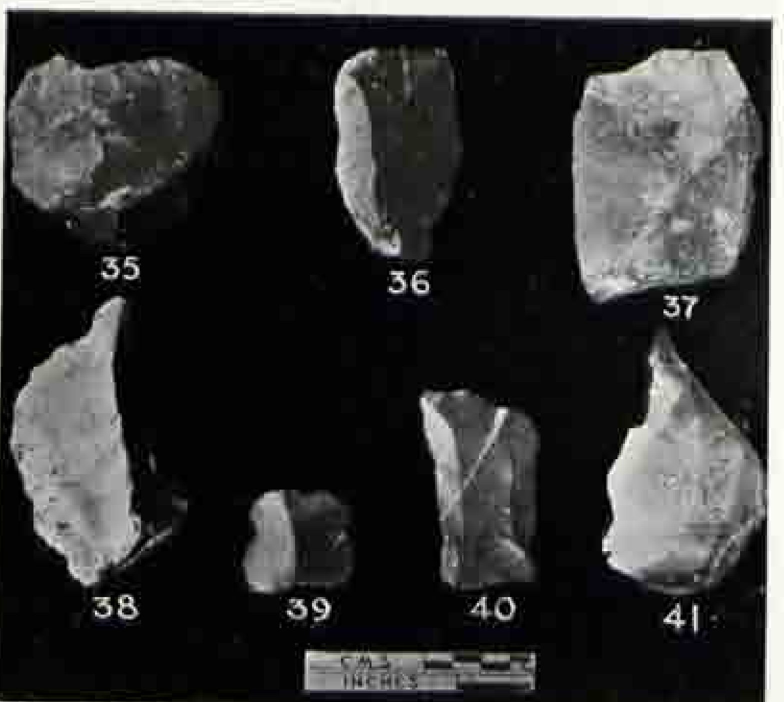


B

Site No. 45-A: A, Cores; B, Blades and backed-blades. See pp. 51, 52 and 53

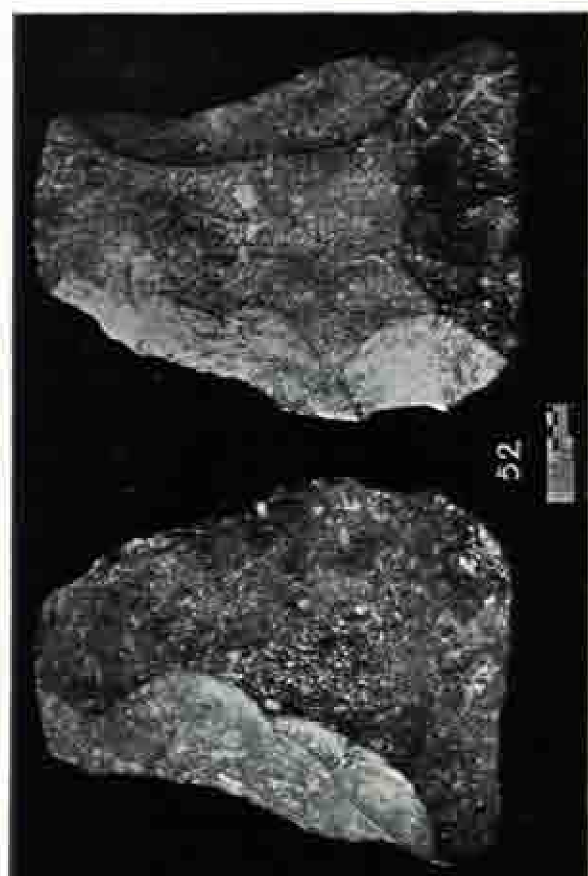


A

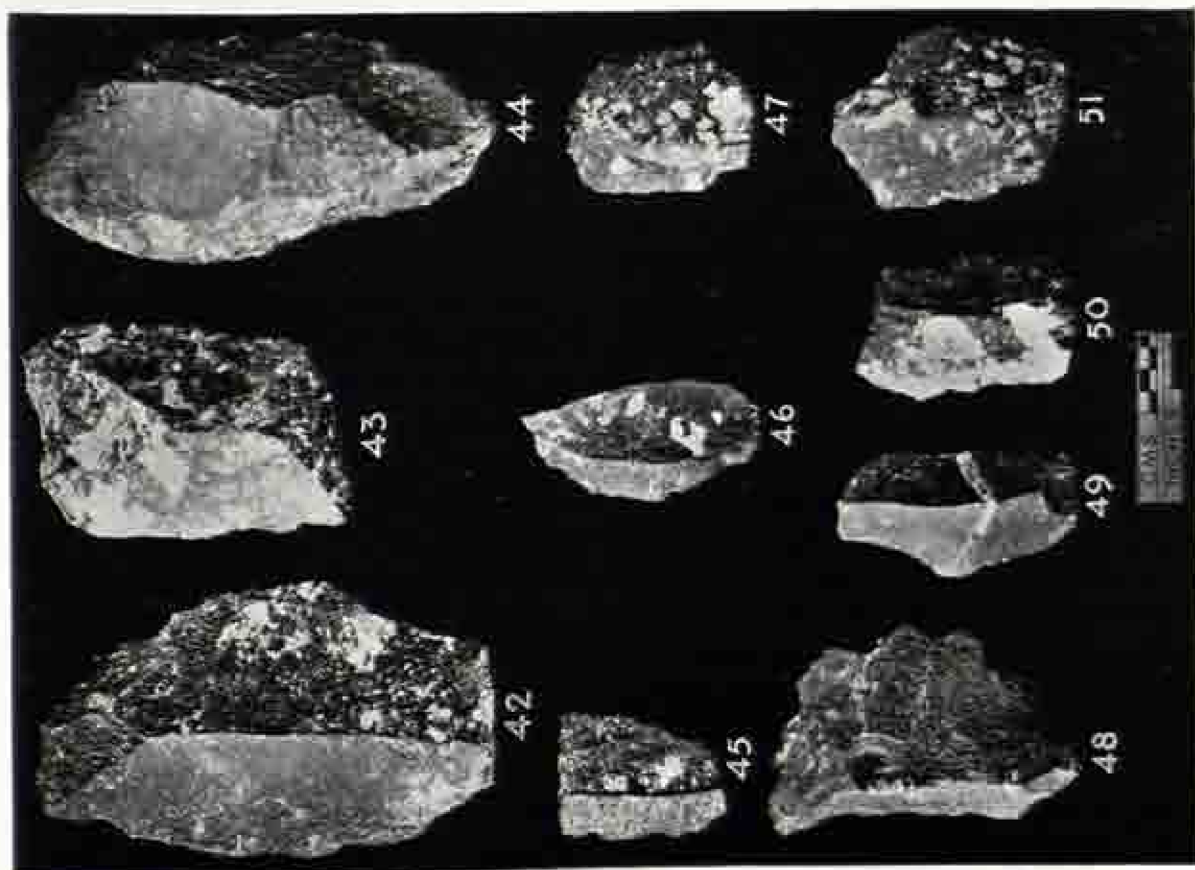


B

Site No. 45-A: A, Lunates and points; B, Points and scrapers. *See pp. 53 and 54*



B



A

Site No. 45: A, Quartzite flake-blades; B, Heavy quartzite flake-blade. See pp. 55 and 56



A

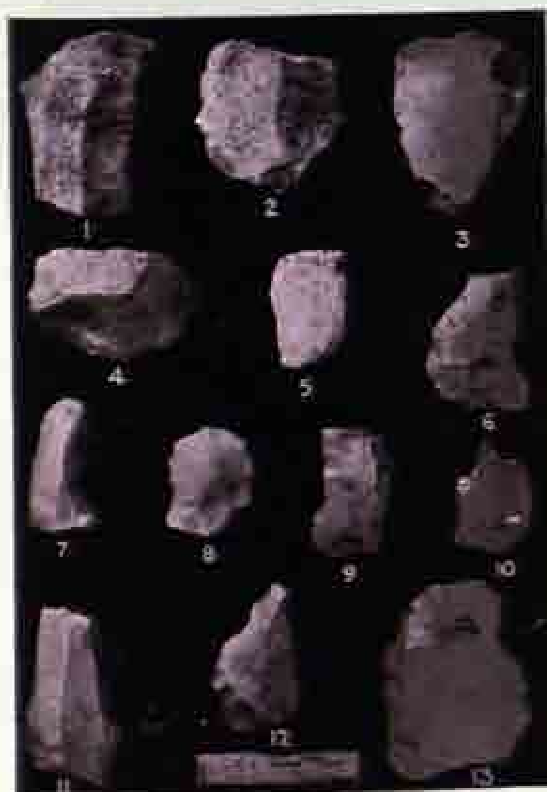


B

Site No. 53: A, *General view before excavation;* B, *Excavation in progress.* *See p. 56*



A

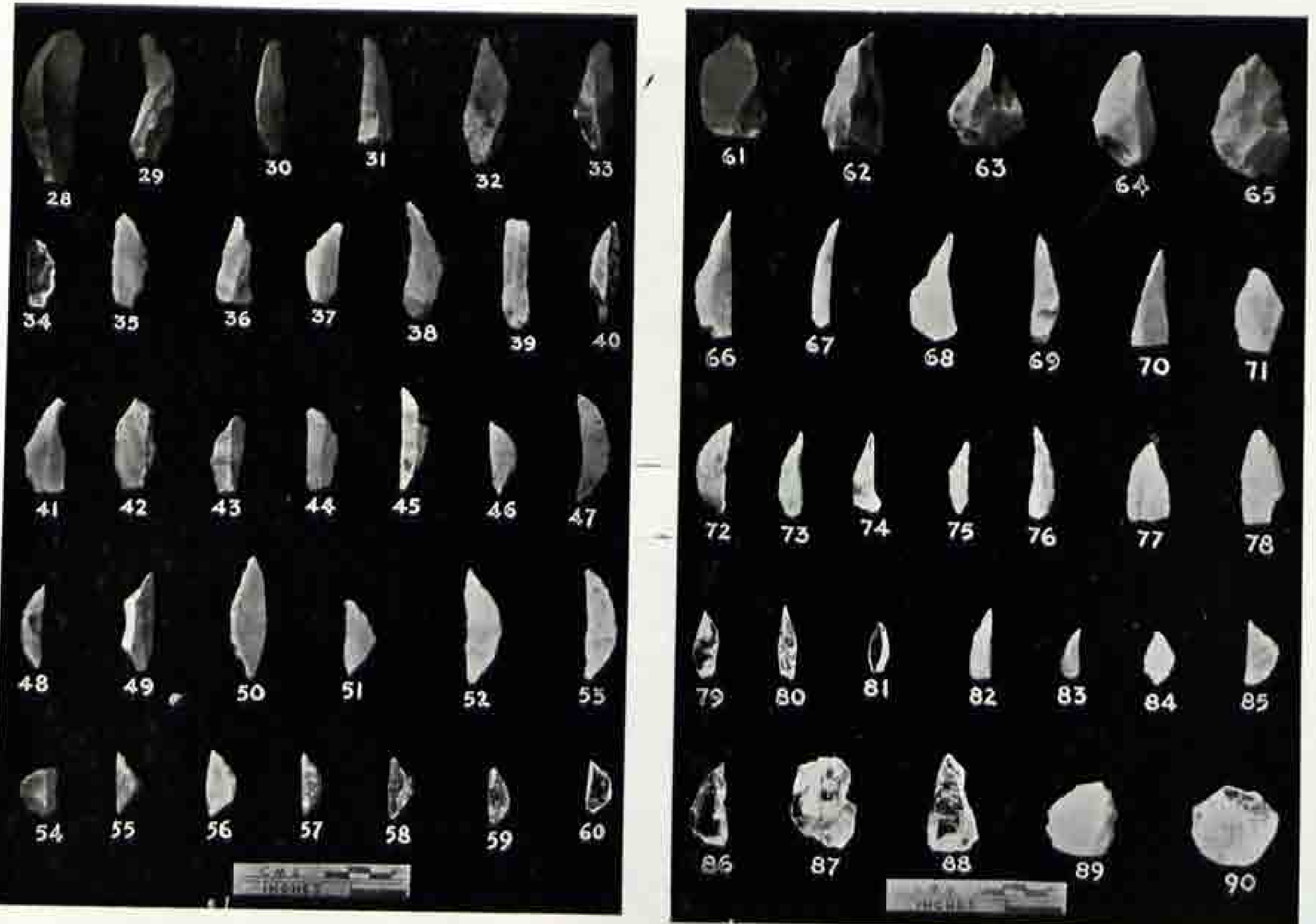


B



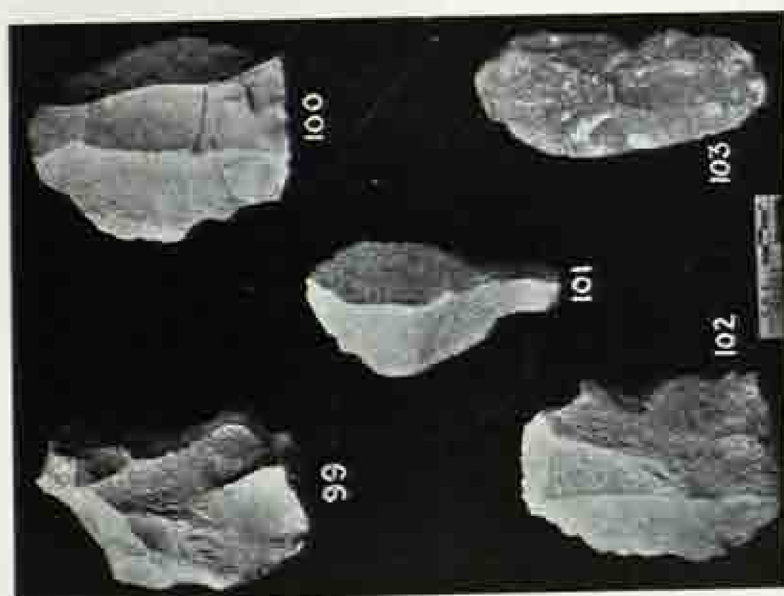
C

Site No. 53: A, *Microlithic section;* B, *Cores and flakes;* C, *Unretouched blades.* *See pp. 57-64*

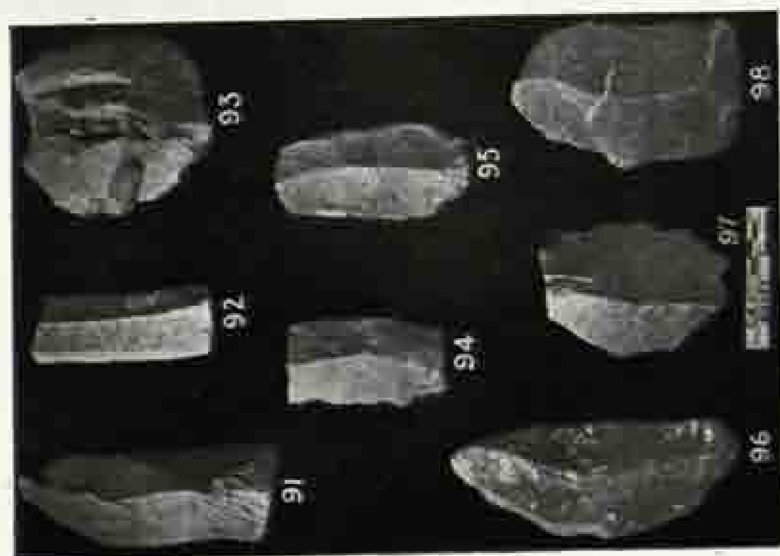


A B

Site No. 53: A, *Retouched backed-blades;* B, *Points, arrow-heads, burians etc.* *See pp. 60-63*



B

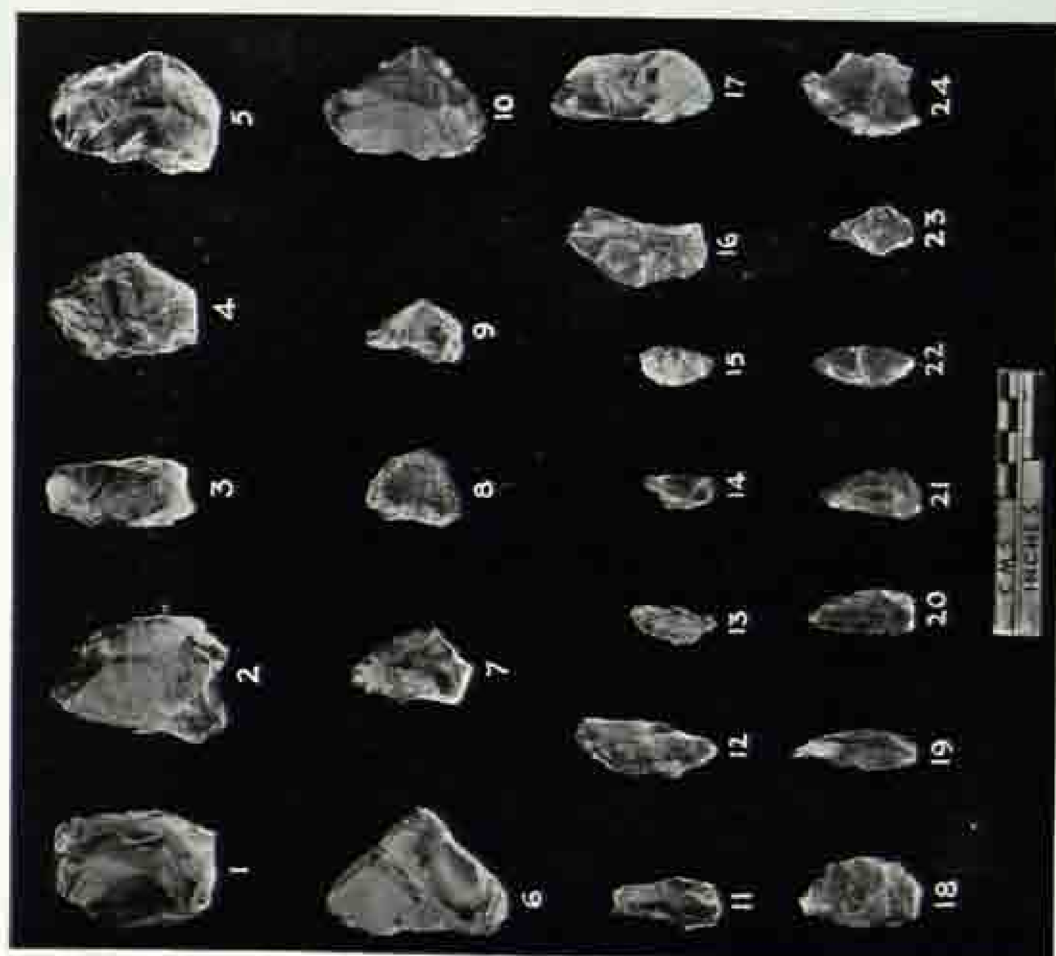


A

Site No. 53: A, Flakes and blades. B, Flakes and blades. *See p. 65*

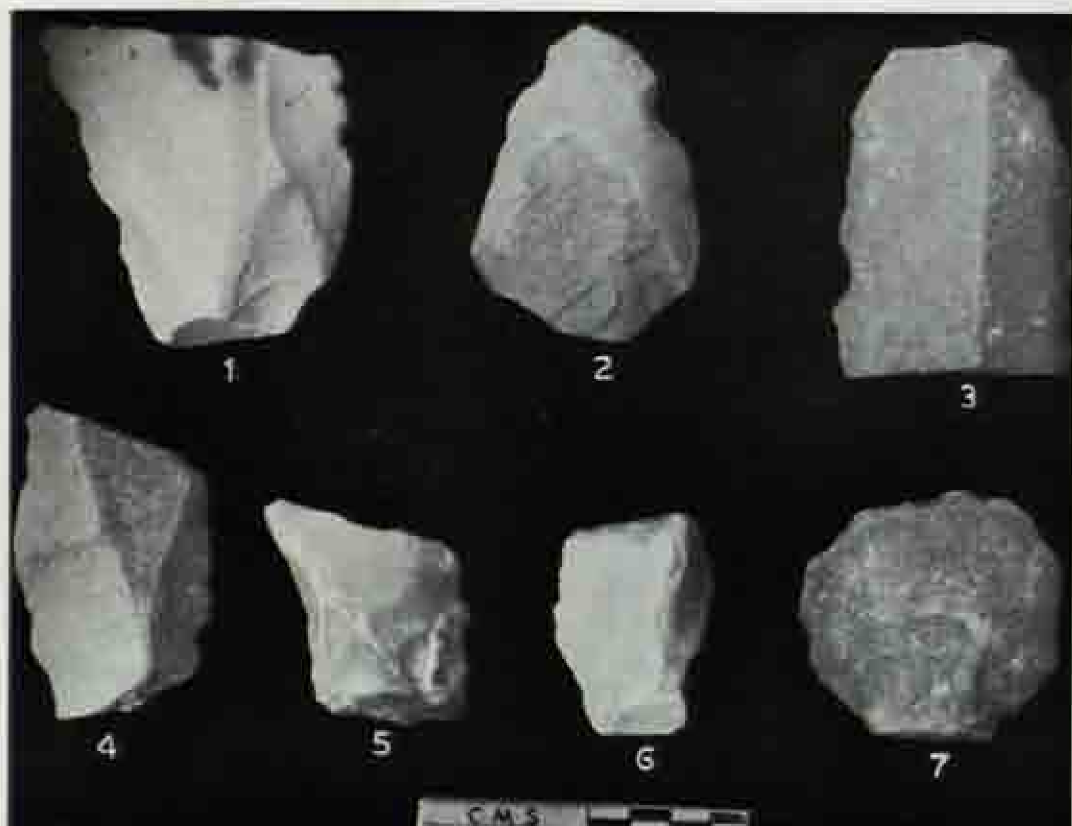


B

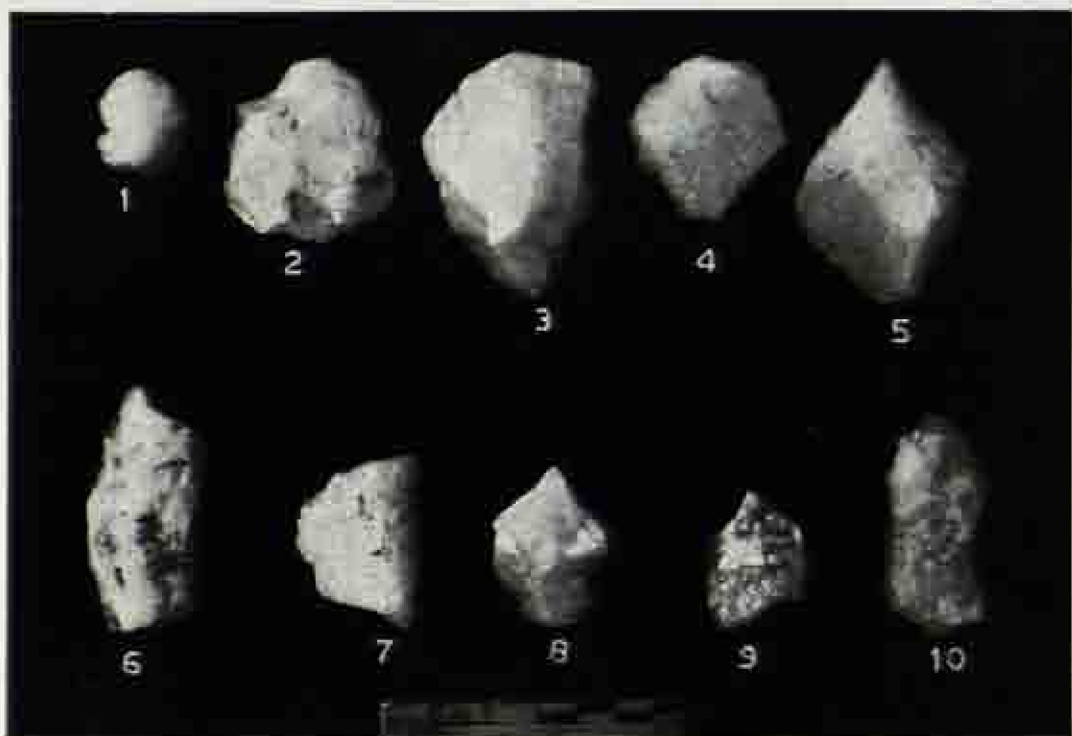


A

Locality C: A, *Microliths, surface collection*; B, *Microliths, surface collection*. *See pp. 67 and 69*

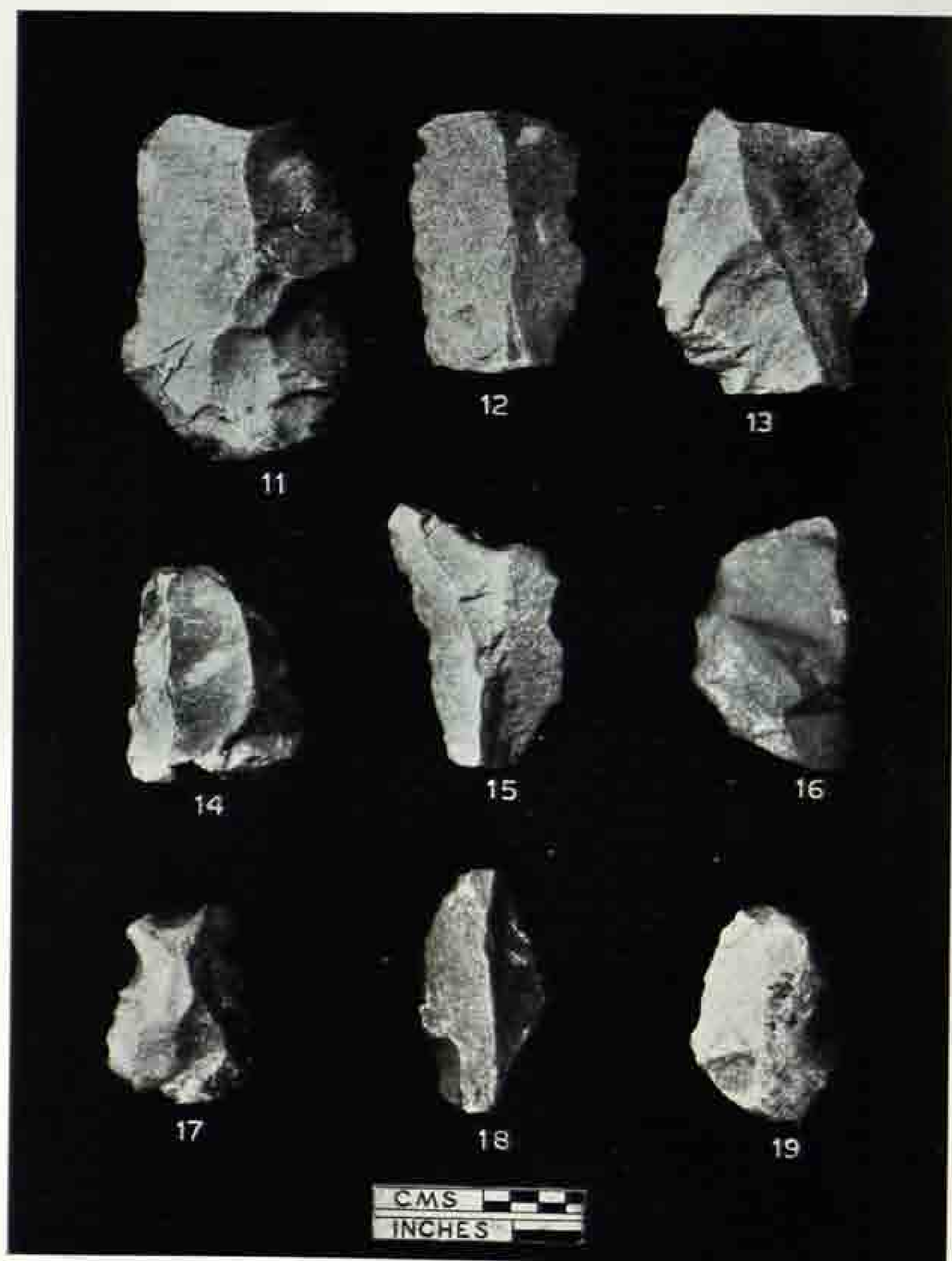


A

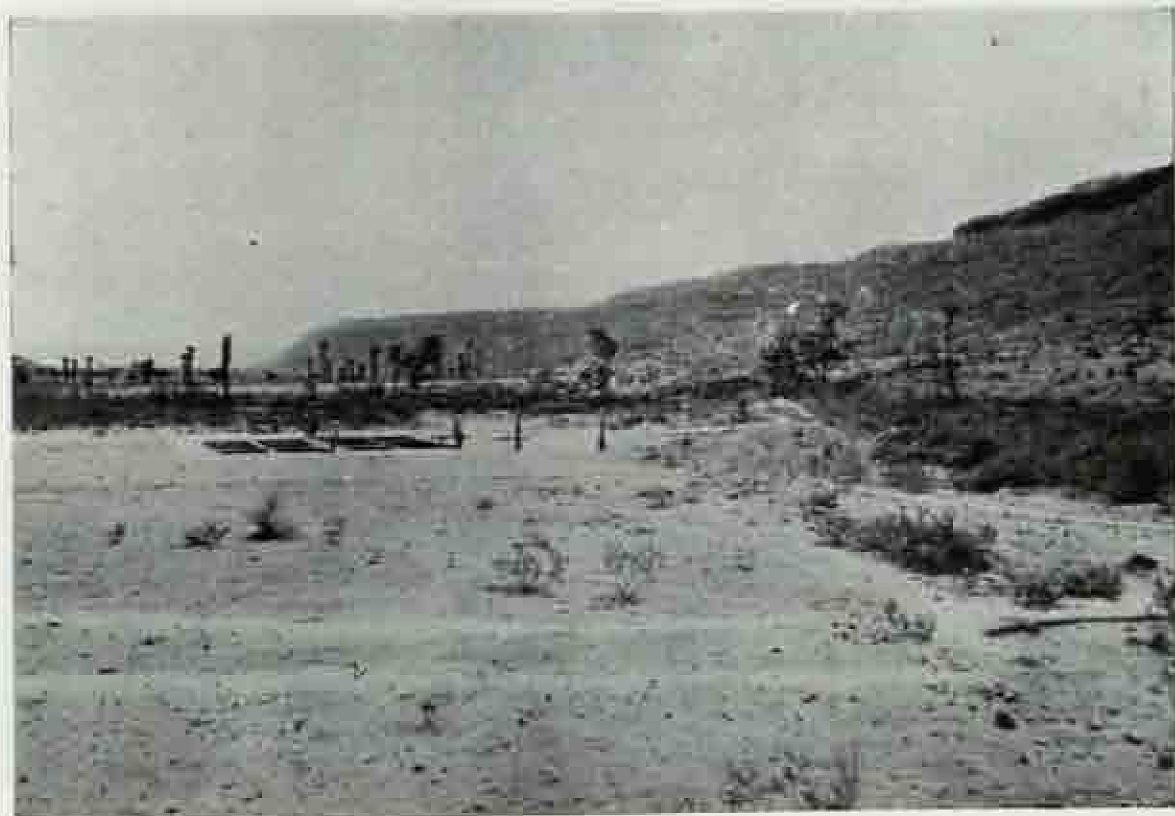


B

A, *Flakes and scrapers, surface collection, Locality* C; B, *Microliths, surface collection, Locality* D. *See pp. 69 and 70*



Flake-blades, surface collection, Locality D. *See pp. 70 and 71*

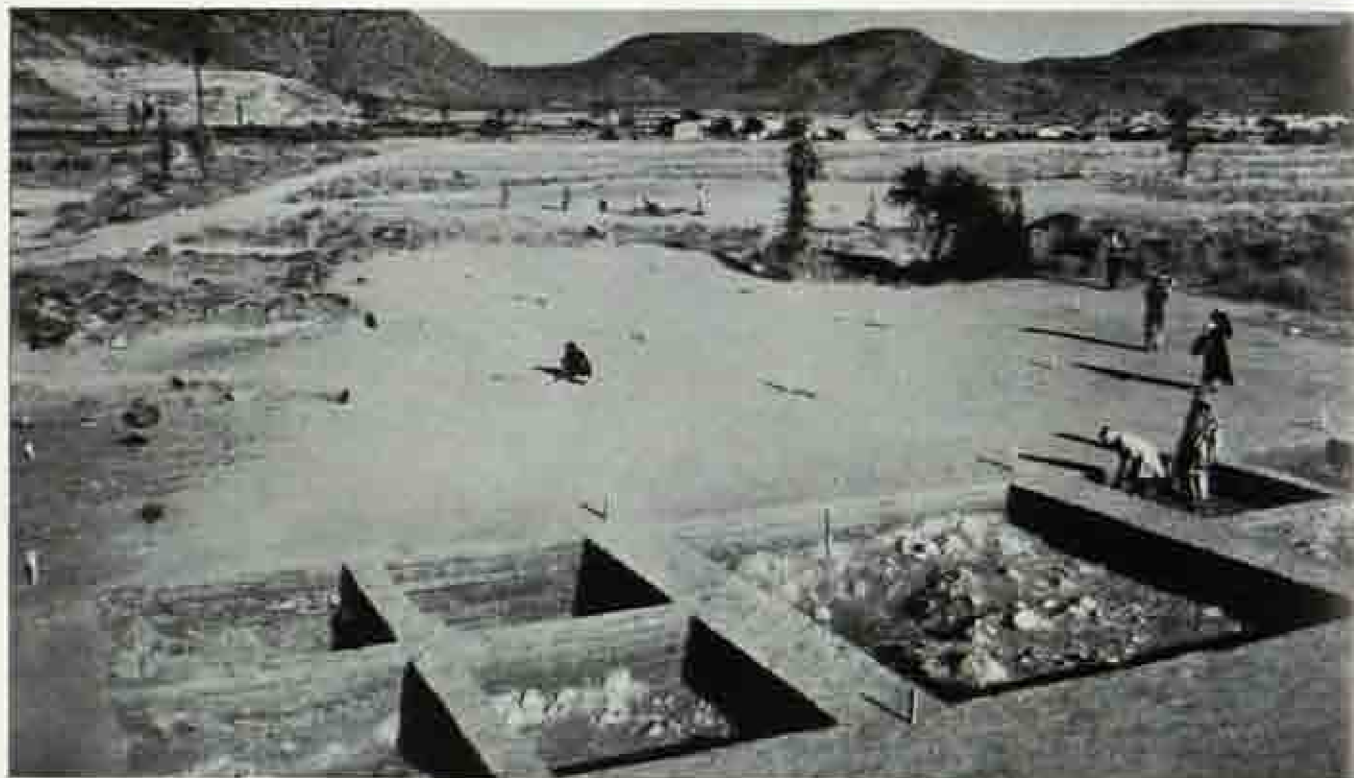


A



B

A *General view during excavation, Site No. 45;* B, *General view during excavation, Site No. 46.* *See pp. 73 and 75*

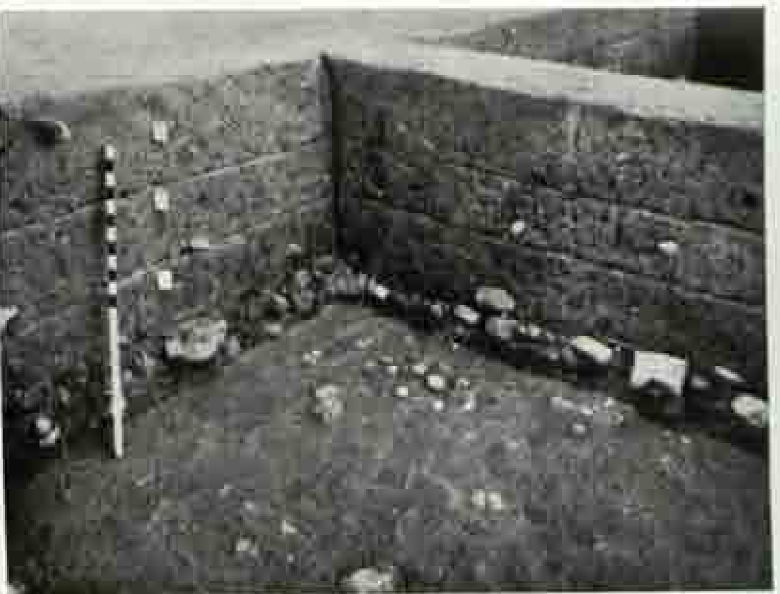


A



B

Site No. 45: A, *General view during excavation;* B, *Section showing cultural deposits in layer 3.* *See pp. 81 and 82*



A

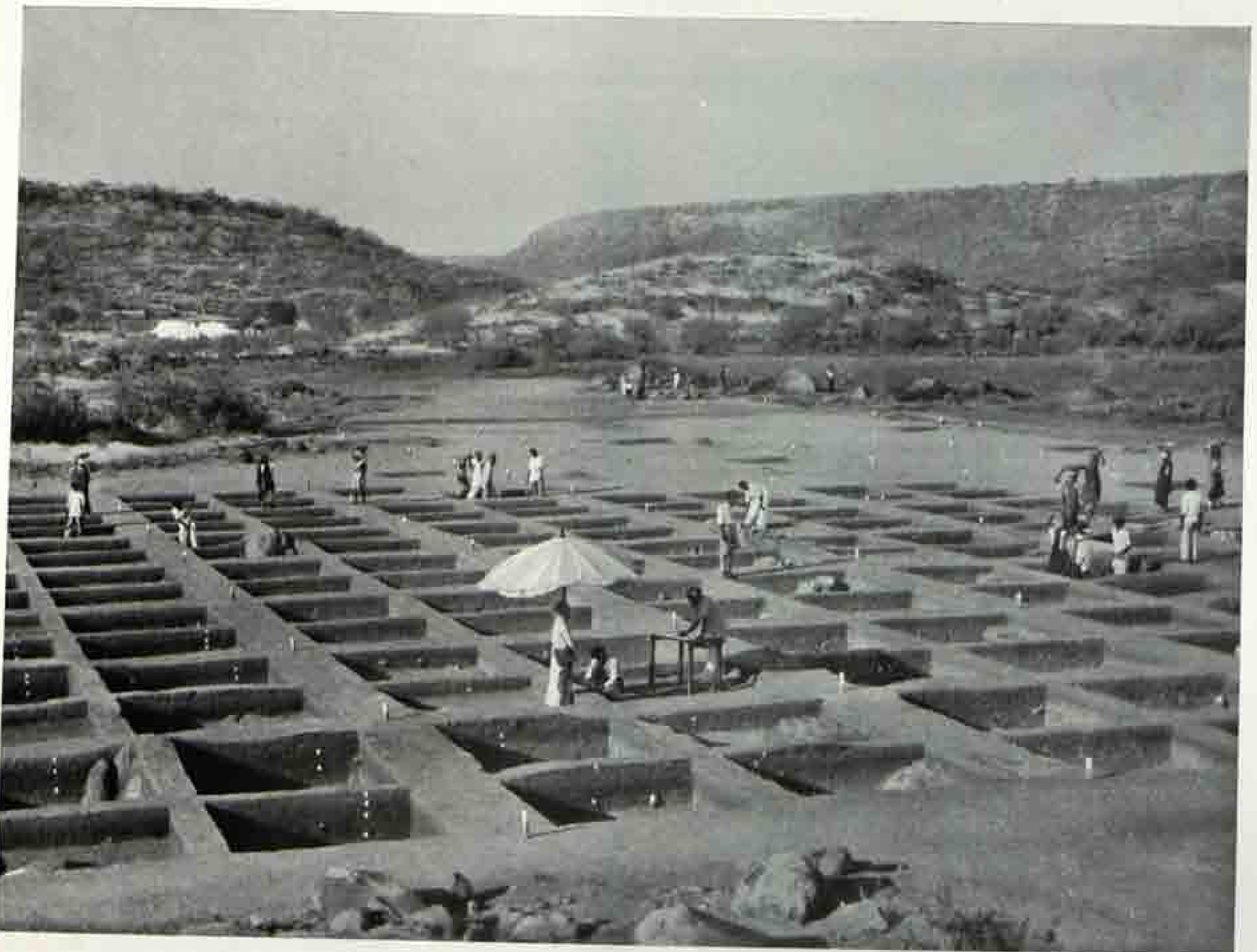


C



B

A, *Section, Site No. 45;* B, *Section showing a bone-tool in alongwith a fabricator, Site No. 46;* C, *Section showing neolithic finds, Site No. 47.* *See pp. 82, 83 and 85*



Site No. 47: General view during excavation. *See p. 85*



A



B

Site No. 46: A, *Section showing pit No. 3,* B, *Section showing pit No. 37.* *See pp. 87 and 89*



A

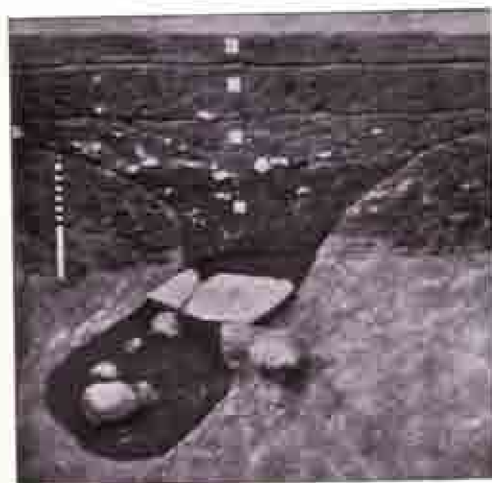


B

A, *Skeletal remains of an animal (deer ?), pit No. 85, Northern extension, Site No. 46;*
B, *Section with pit Nos. 1 and 1A and a post-hole, Site No. 46-A.* *See p. 92*



A



C

B

Site No. 46A; A, *Pit No. 2;* B, *Section showing pit No. 8 in the foreground,*
C, *Section showing pit No. 10.* *See pp. 92 and 93*



A



B

Site No. 46A: A, Pit No. 12. B, Section with pit No. 18 in the foreground. *See pp. 93 and 94*



Alignment of post-holes, house no. 5, Site No. 46. *See p. 99*



Semi-subterranean dwelling with post-hole in the right foreground, house No. 7, Site No. 46-A. *See p. 100*

A



B

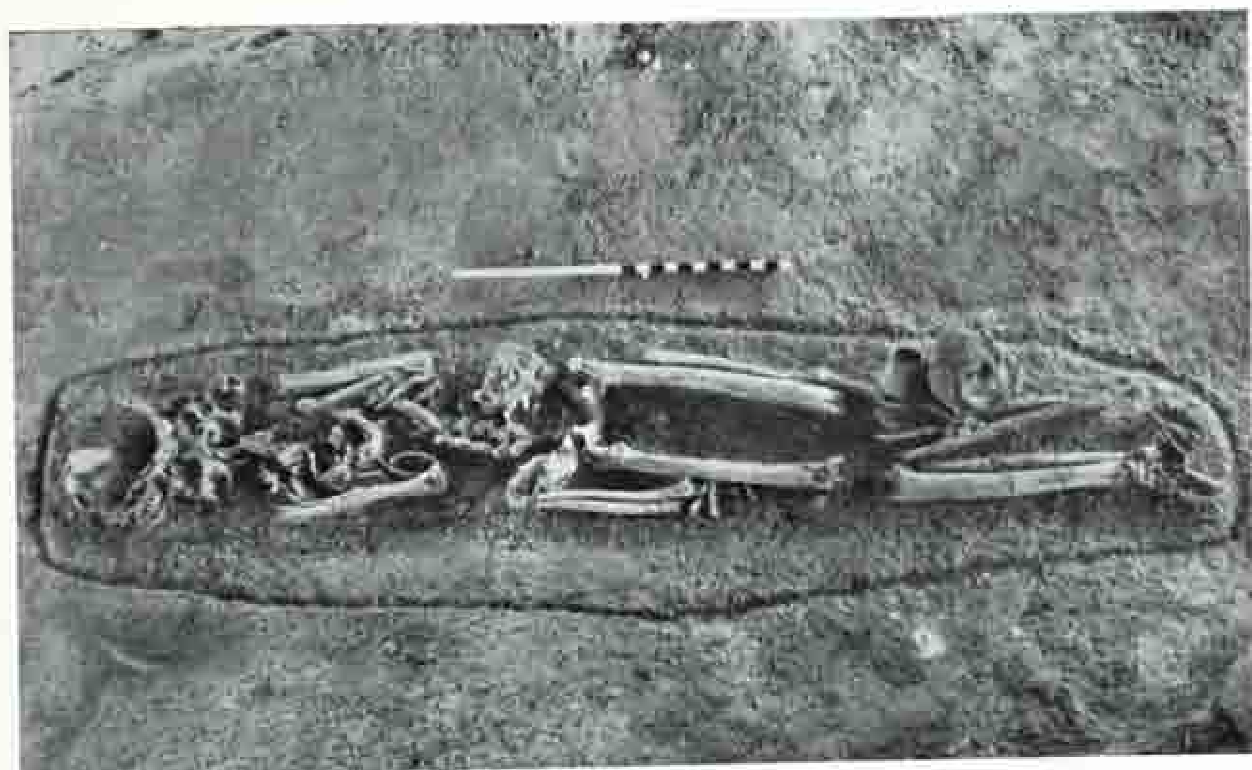
Site No. 68: A, *Section and grave-pits showing skeleton Nos. 8 and 9;* B, *Section showing Skeleton No. 5 in the foreground.* *See p. 104*

A



B

Site No. 68: A, Skeleton Nos. 1 and 4, B, Skeleton No. 10. See pp. 104 and 105



A



B

Site No. 68: A, Skeleton No. 6. B; Skeleton No. 7. *See p. 175*



Site No. 46-A: Fully exposed human skeleton, pit No. 8. *See p. 105*



A



C



B

Site No. 68: A, *Side view;* B, *Back view;* C, *Top view; restored skull; Ngk. Neo. 3.* *See p. 108*



A



B

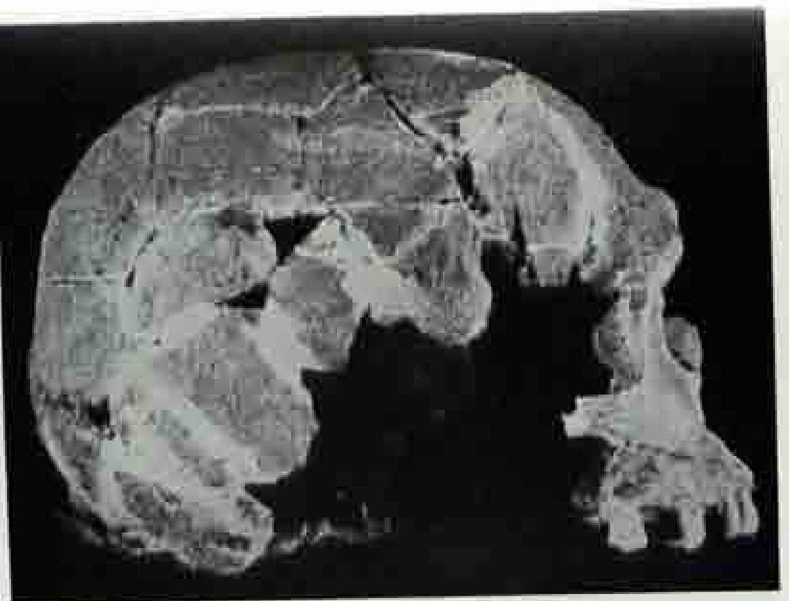


C

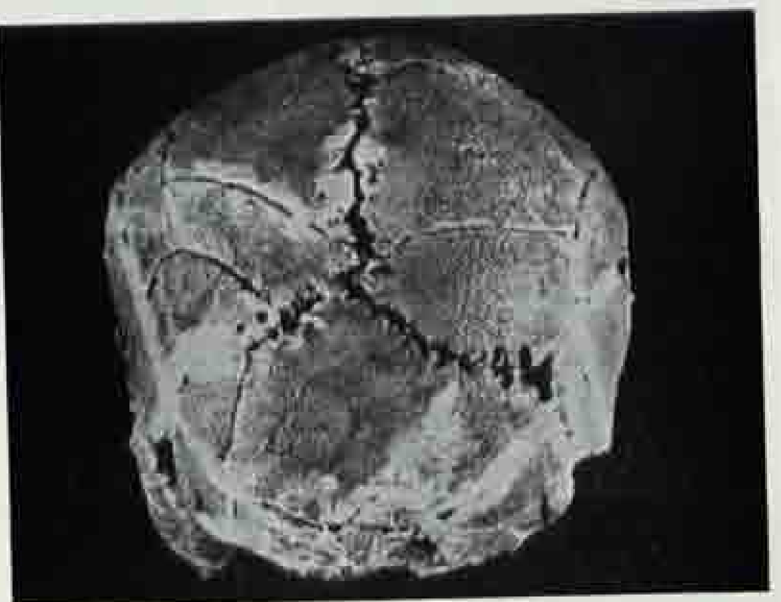
Site No. 68: A, Side view; B, Back view; C, Top view; restored skull, Ngk. Neo. 9. *See p. 108*



A



B



C

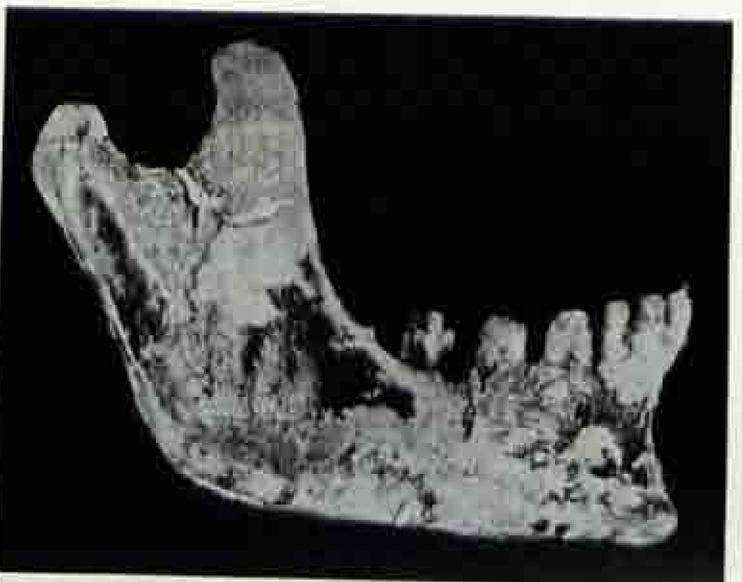
Site No. 46-A: A, *Front view;* B, *Side view;* C, *Top view: restored skull, Ngk. No. 11.* *See p. 109*



A



B



C

Site No. 46-A: Neo. 11: A, Side view; B, Mandible; C, Mandible, side view, restored fragments of skull, Ngk. *See p. 112*



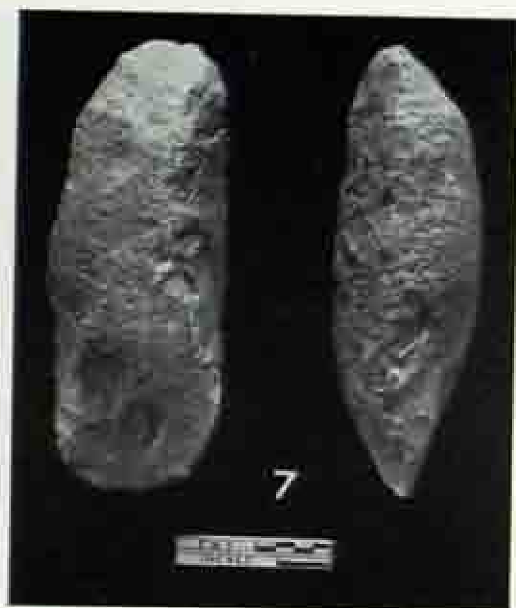






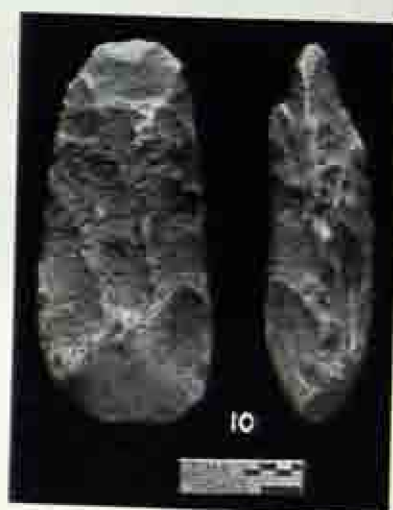


Axes. *See. pp. 131 and 132*











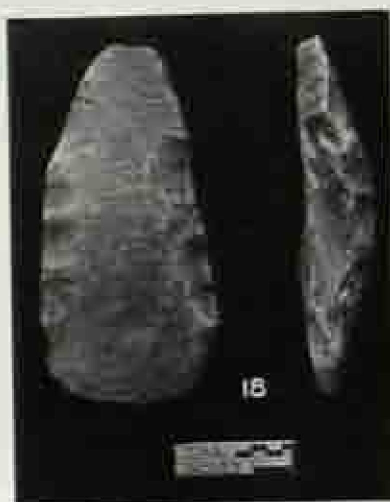


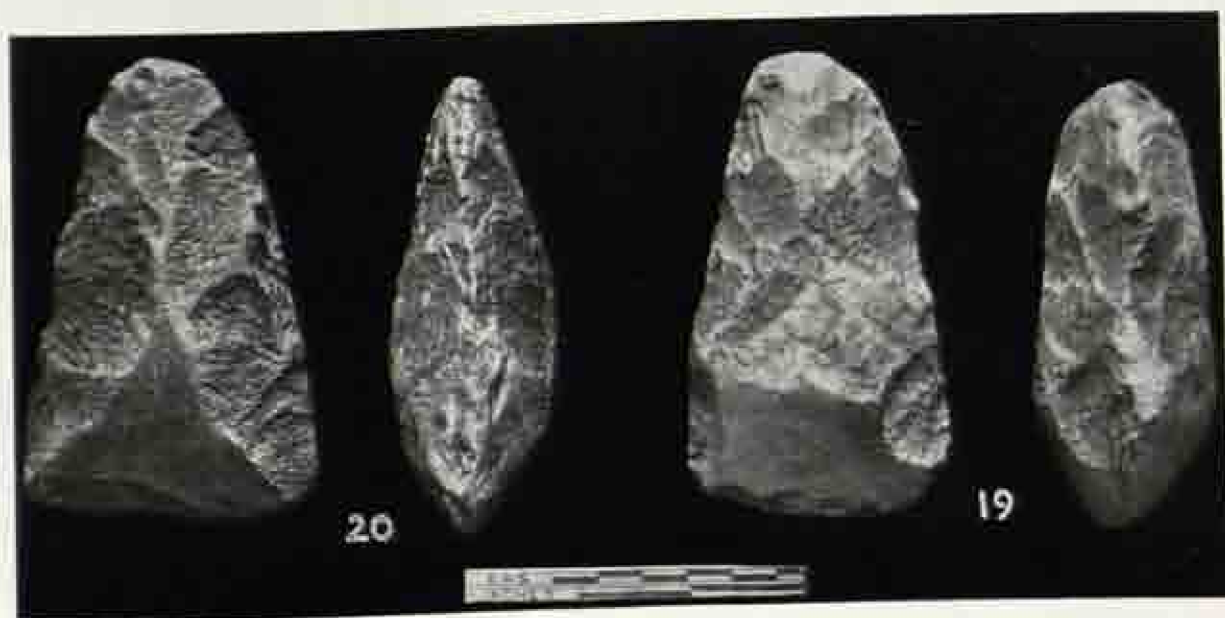
Axes. See pp. 131 and 132











Axes. See pp. 132 and 133











Axes. *See pp. 133 and 134*















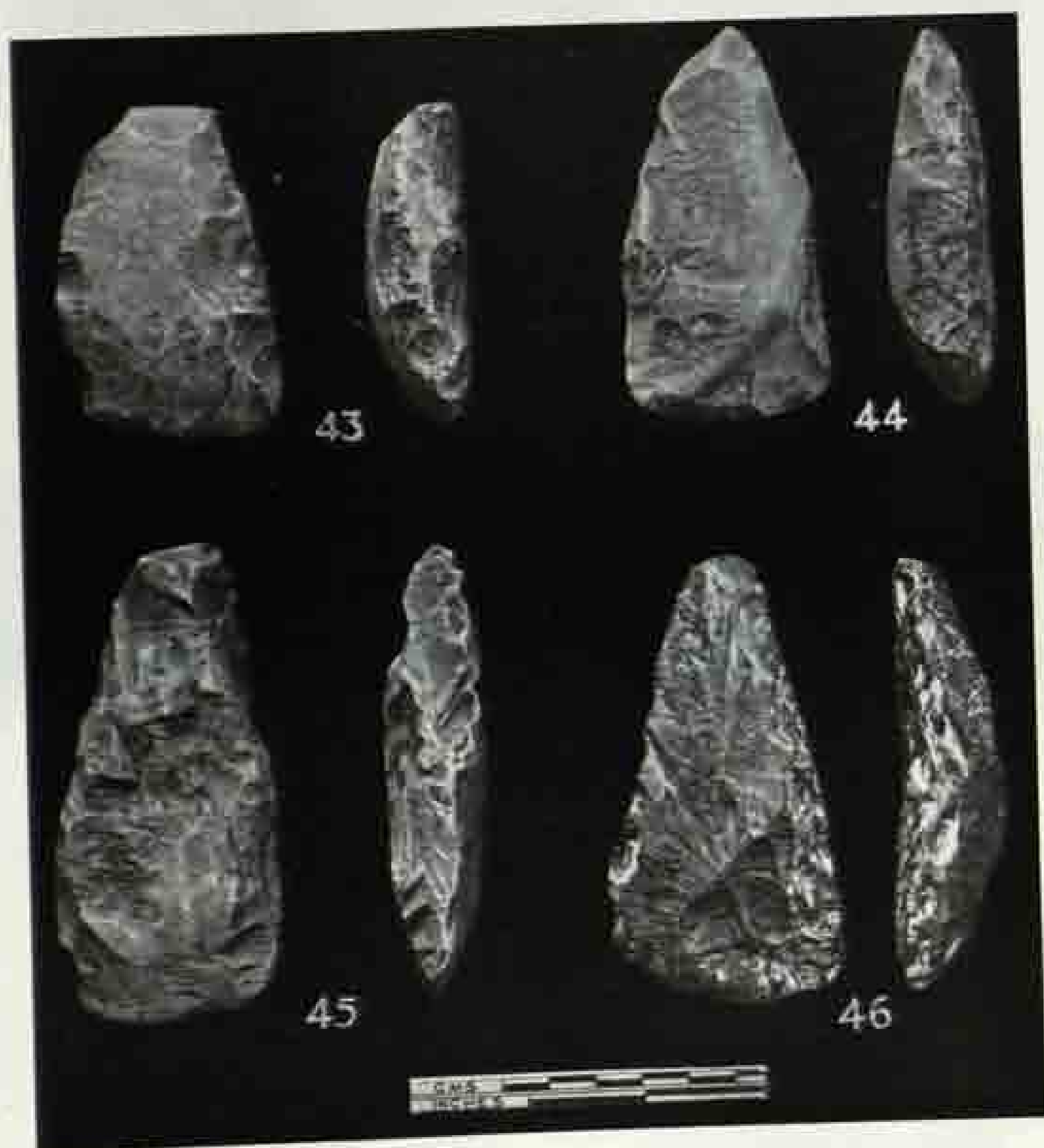


Axes. *See p. 134*

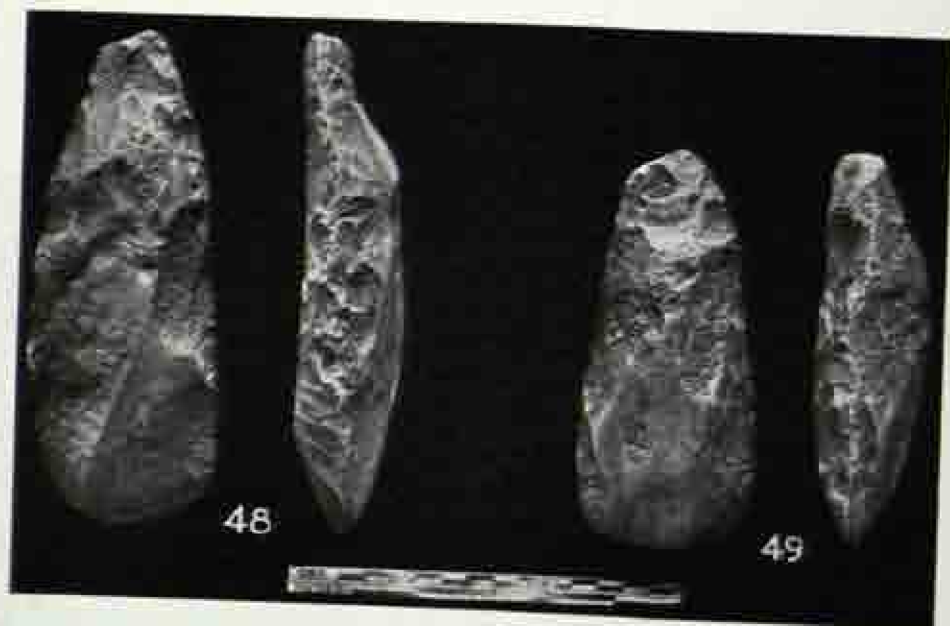




Adzes. See pp. 135 and 136

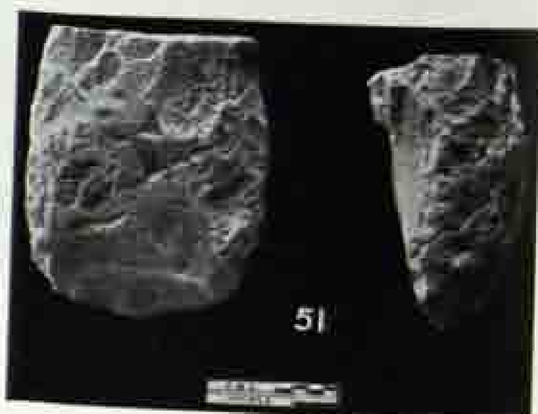


Adzes. *See pp. 135 and 136*





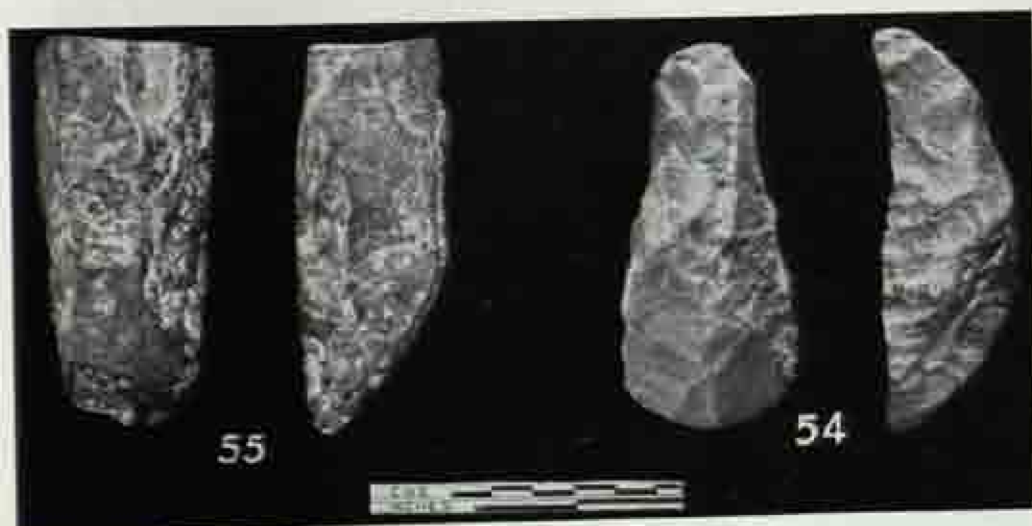






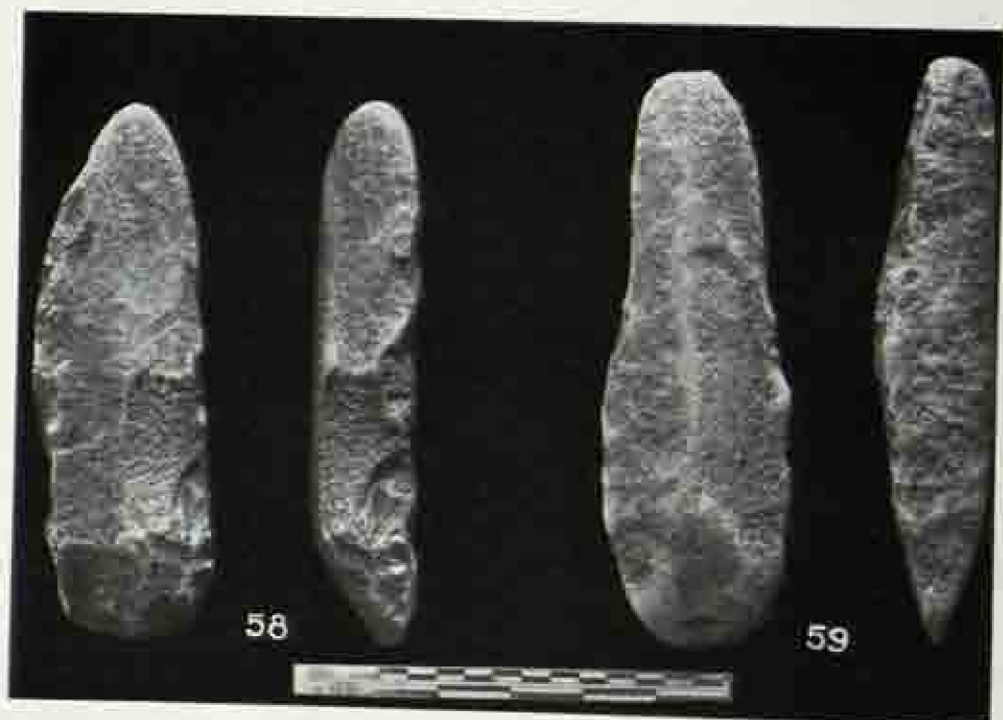


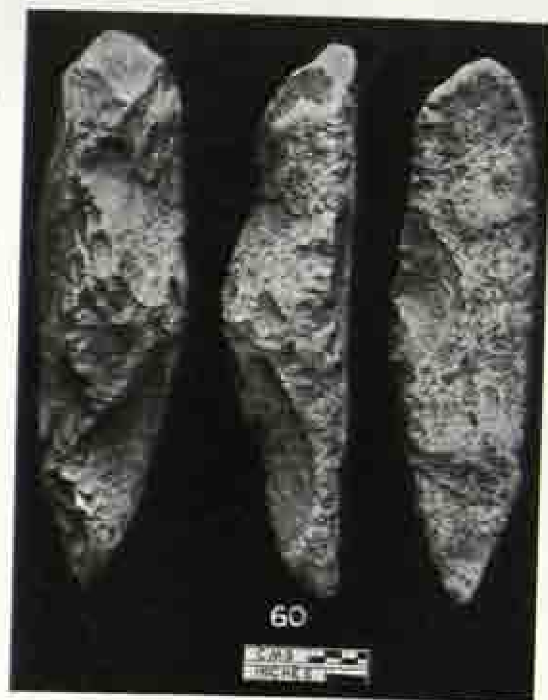
Celts with elongated external form. *See pp. 135 and 136*





Shoe-last celts. *See p. 136*







Long weeding hoe and picks. *See p. 137*





Picks. *See p. 137*



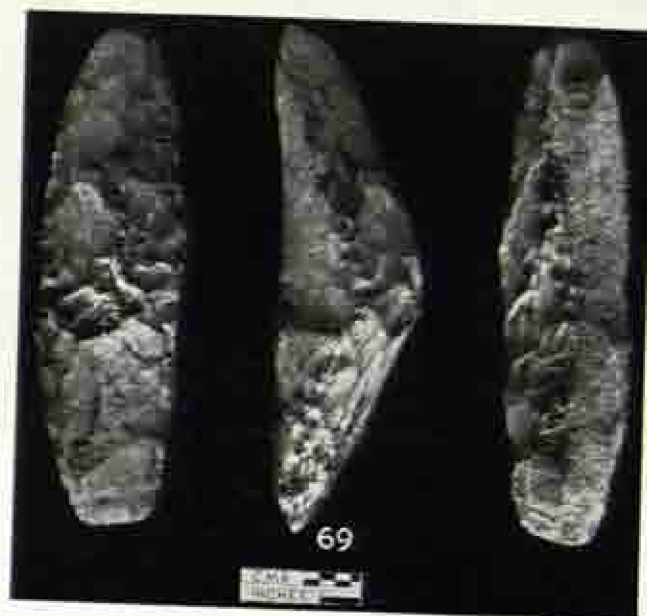








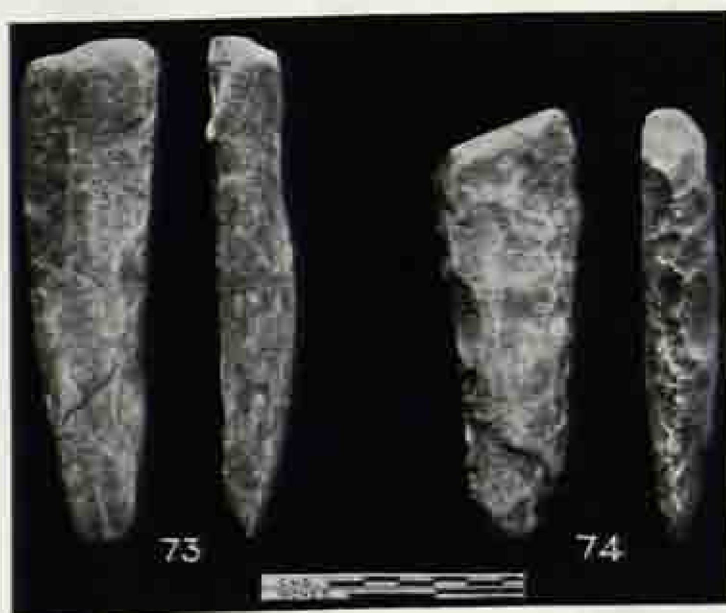
B



Picks. *See pp. 136 and 138*







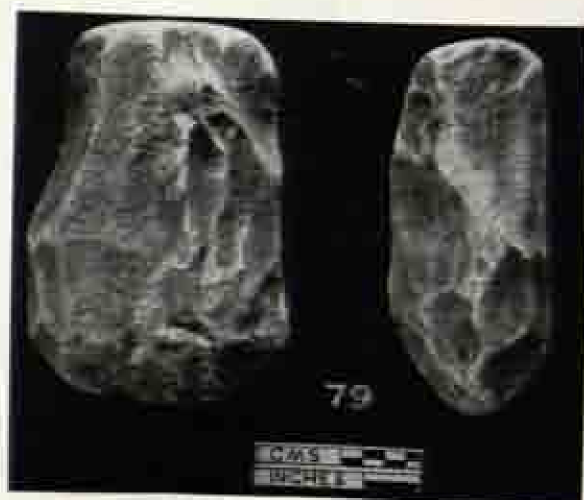
Chisels and axe-cum-hammer. *See pp. 138 and 139*



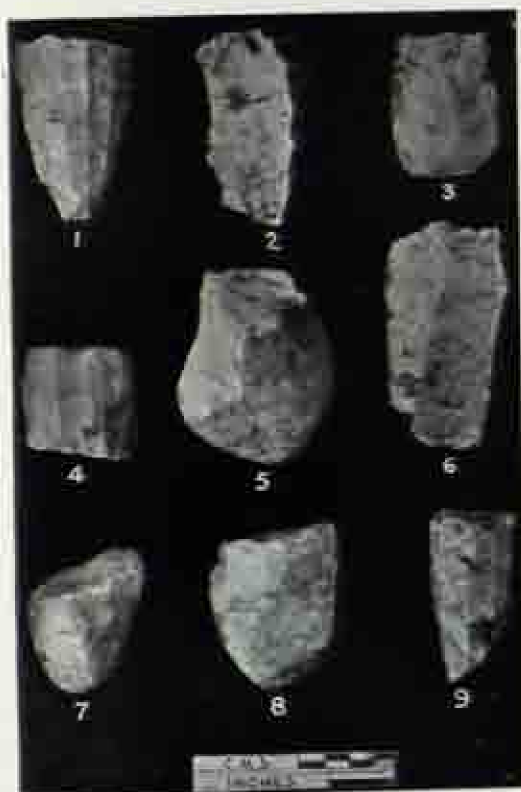


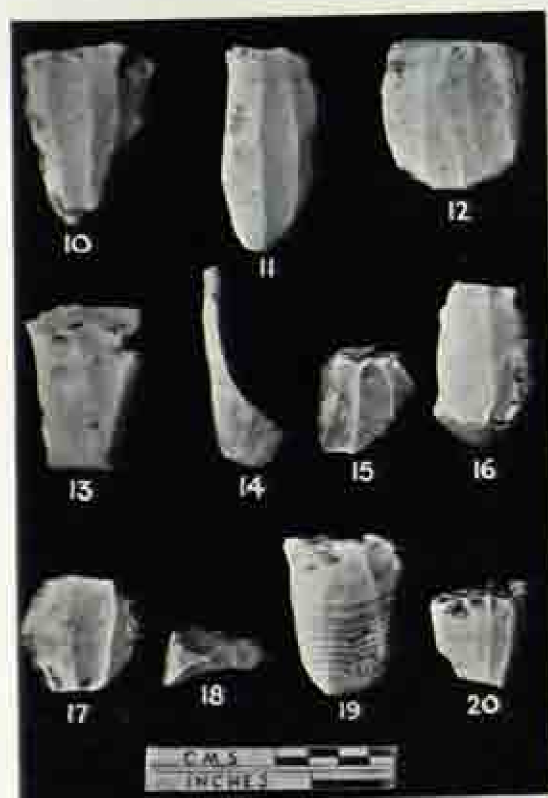


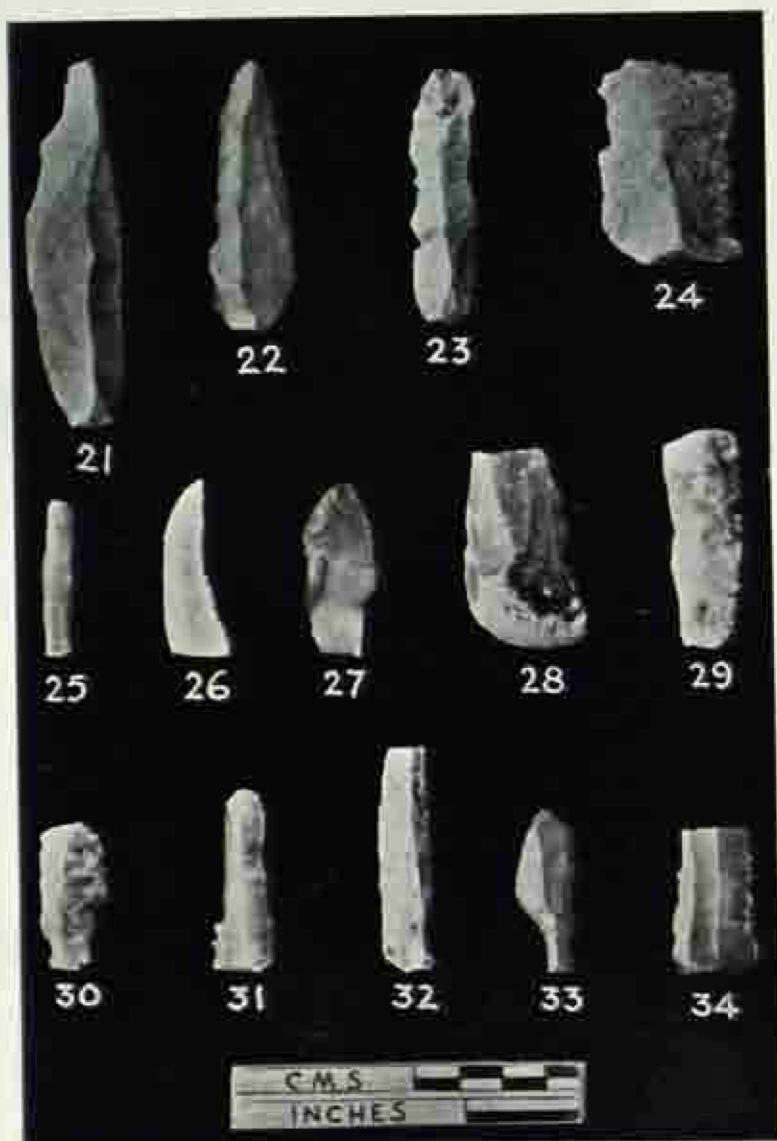




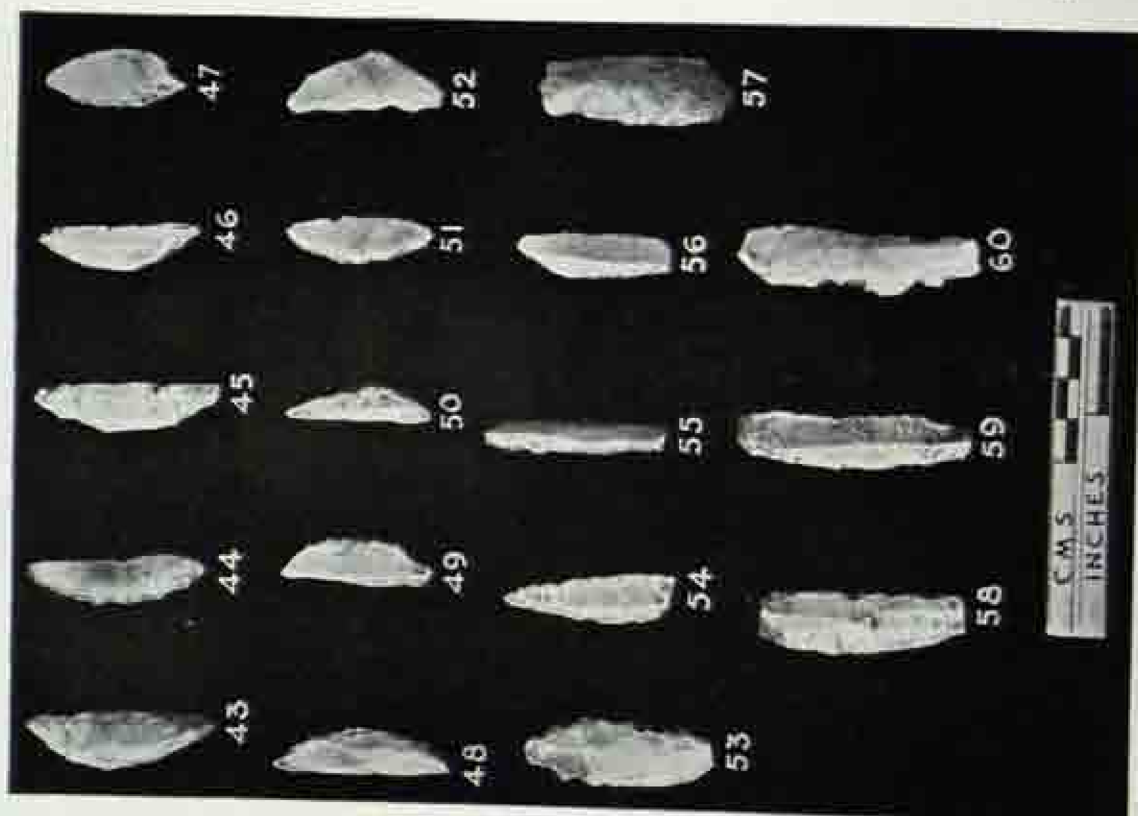
Axe-cum-hammers, side chopper in flake and fabricators. *See p. 139*

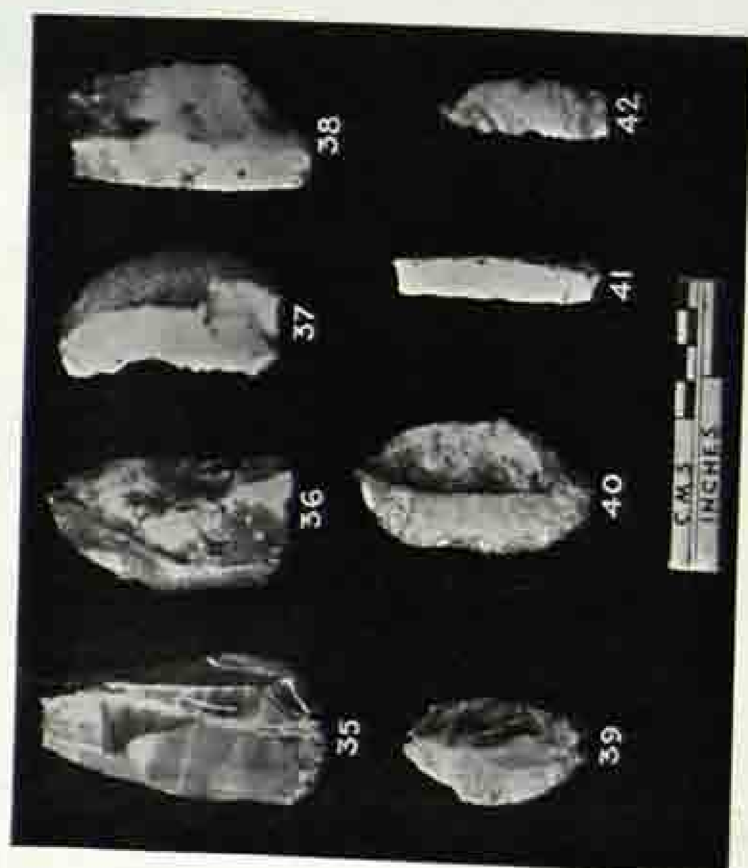




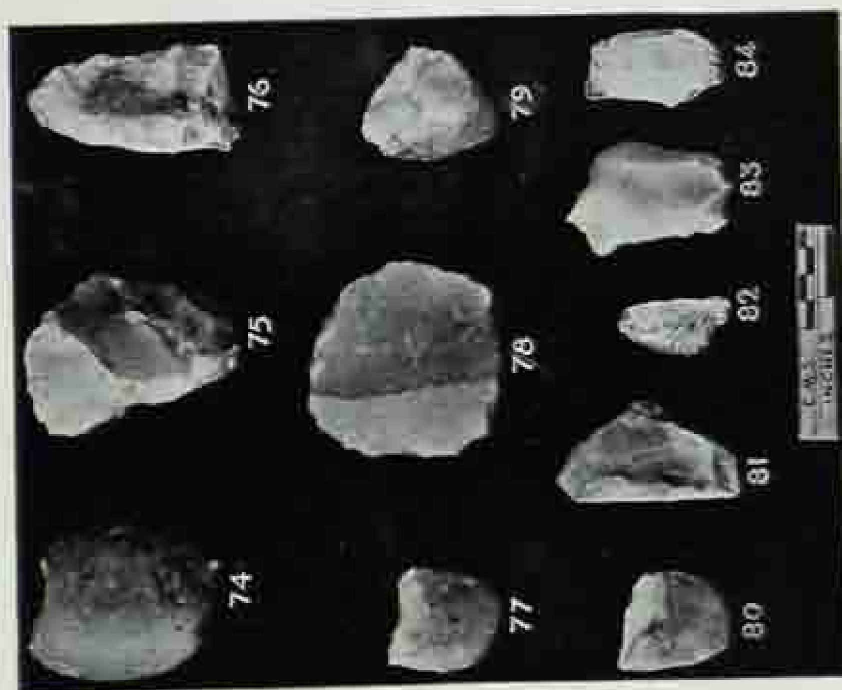


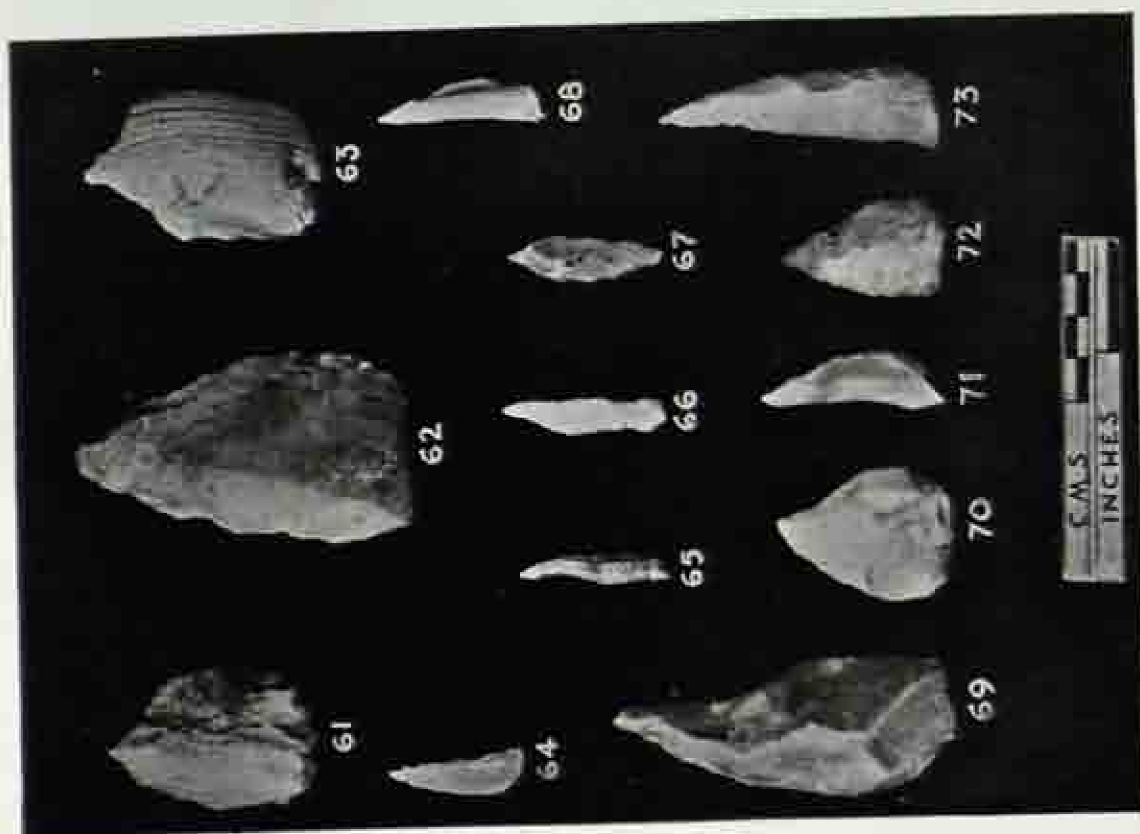
Cores and flakes, microlithic industry. *See pp. 143-145*





Flakes, lunates, points and scrapers; microlithic industry. *See pp. 145-147*

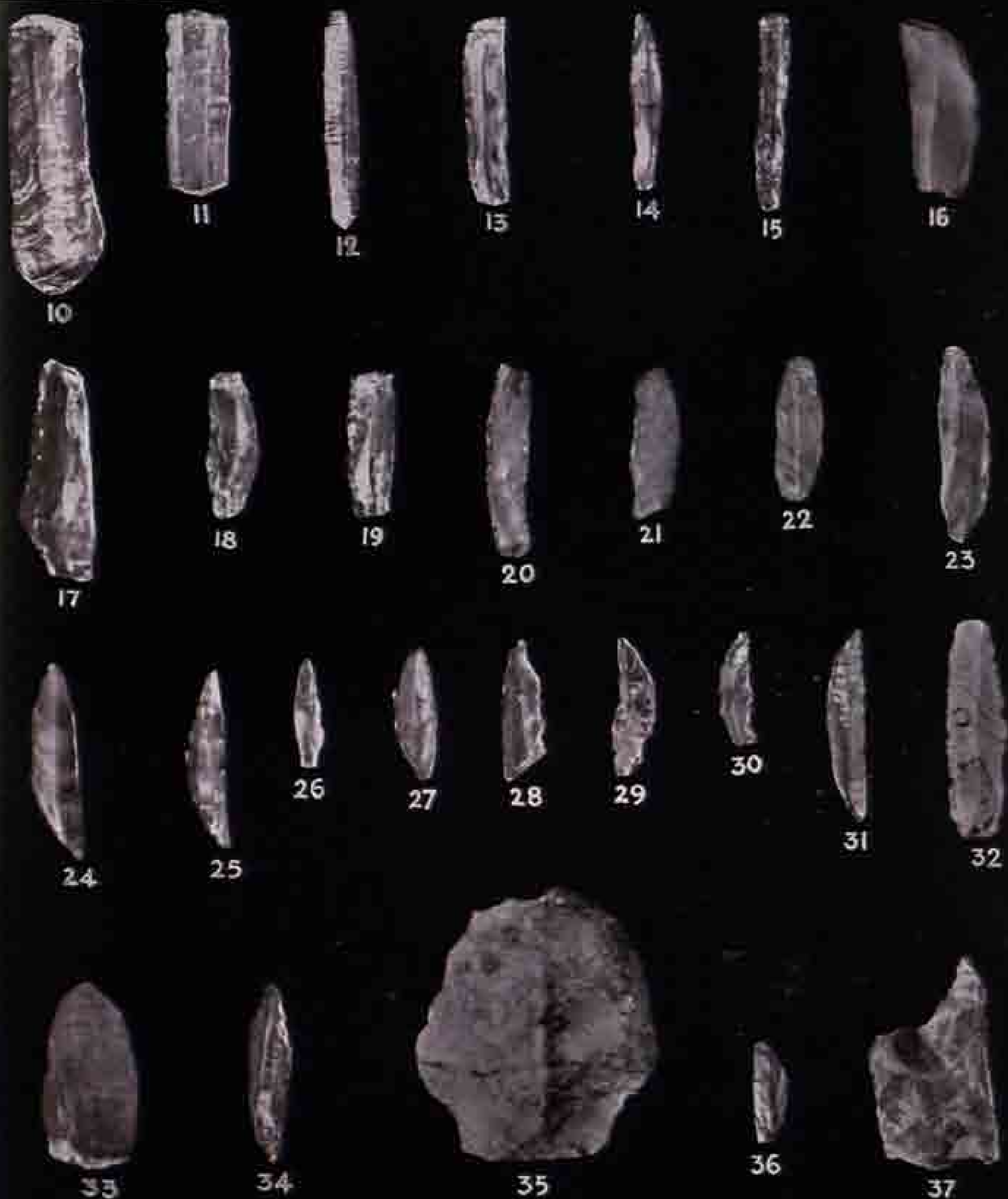




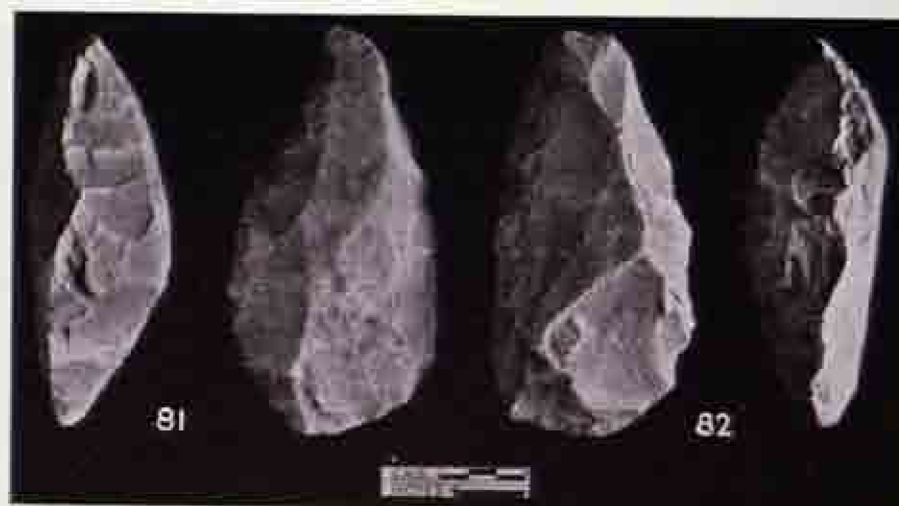
Points and scrapers, microlithic industry. *See pp. 147 and 149*



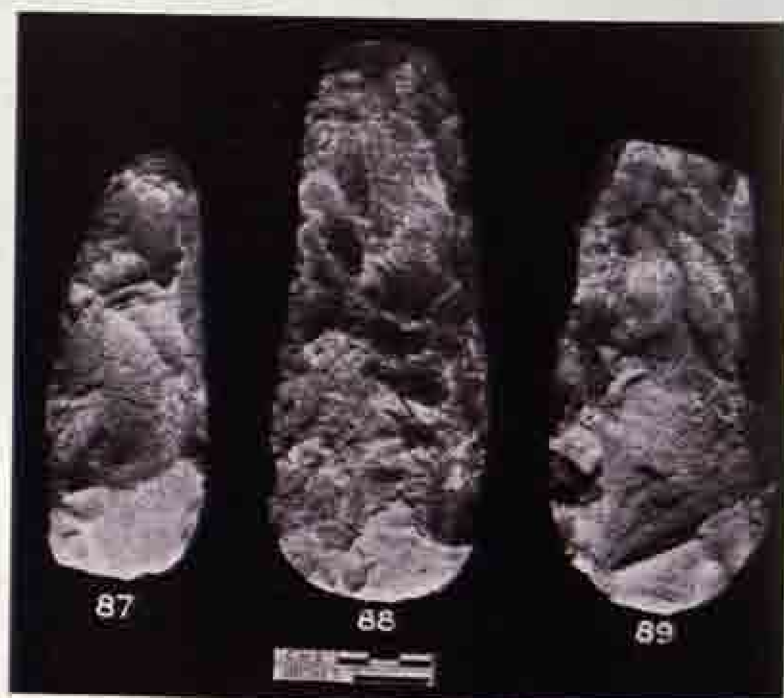
Cores and scrapers. See pp. 150 and 153



Blades, tanged and crescentic tools, lunates and points. *See pp. 150-153*







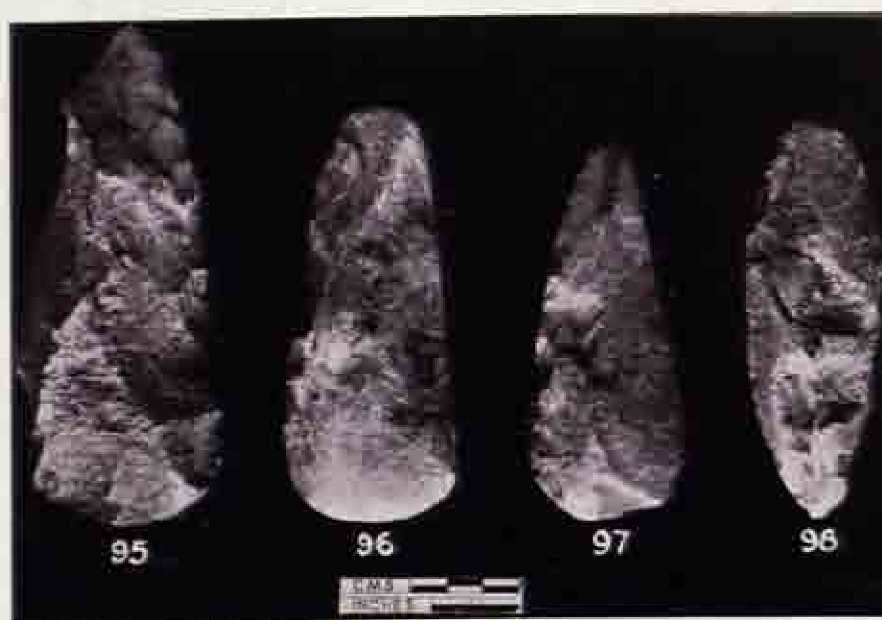




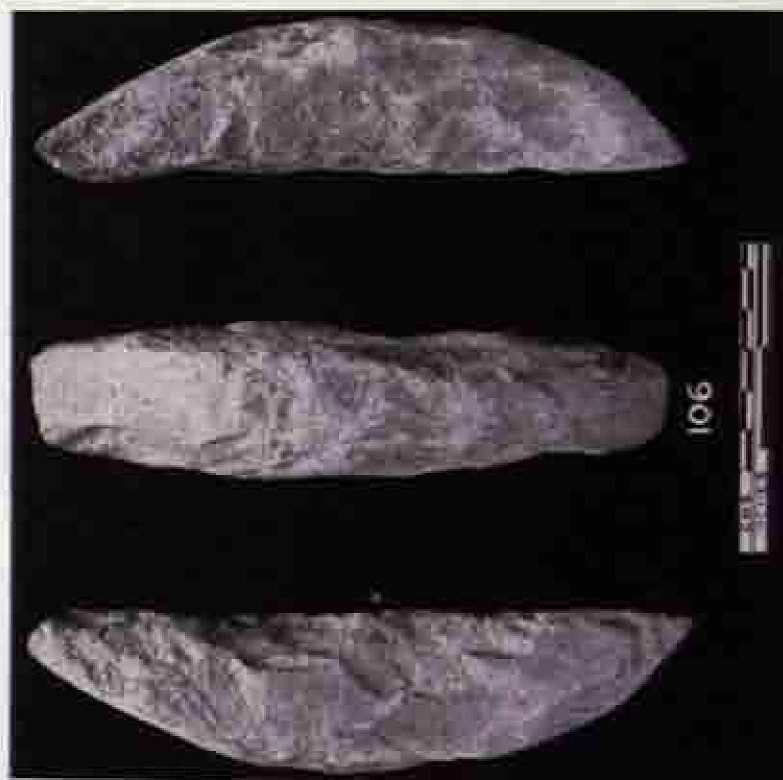
Neoliths from surface. *See p. 154*

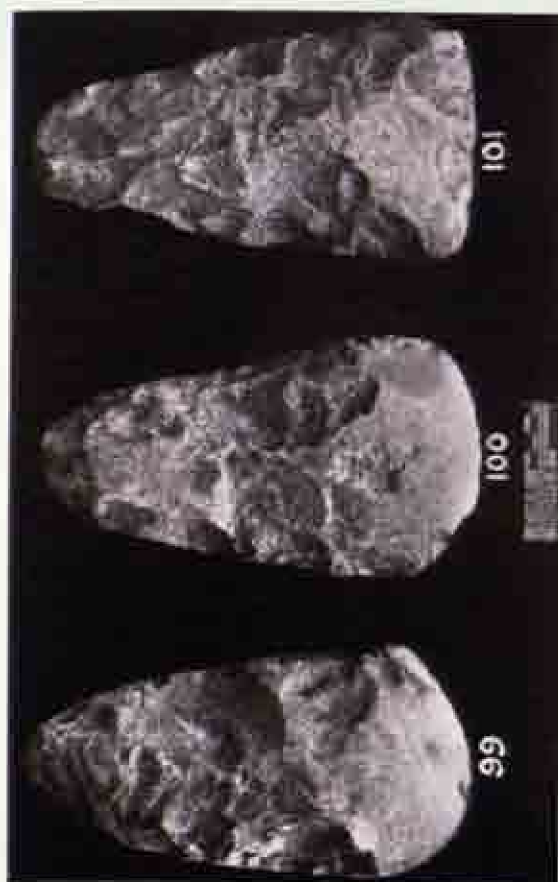






Neoliths from surface. *See pp. 154 and 155*

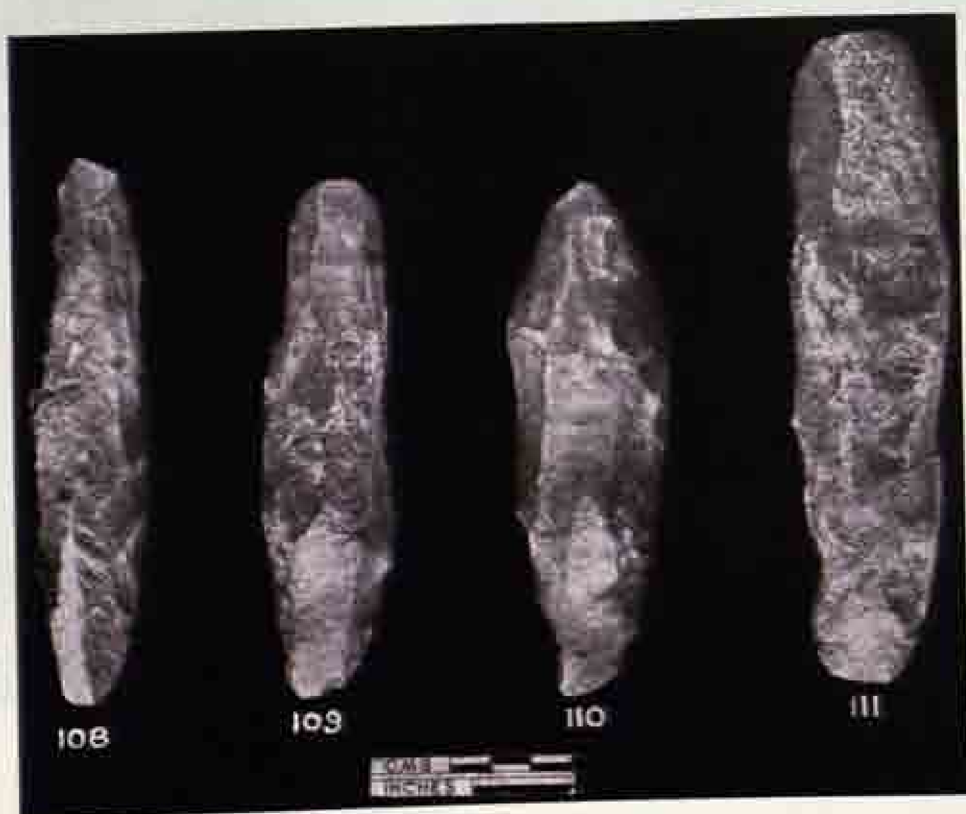




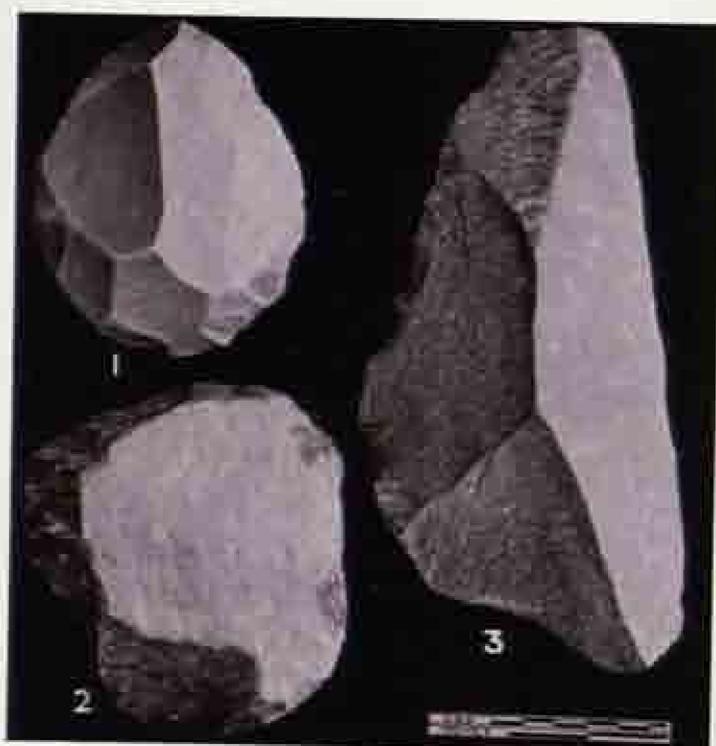


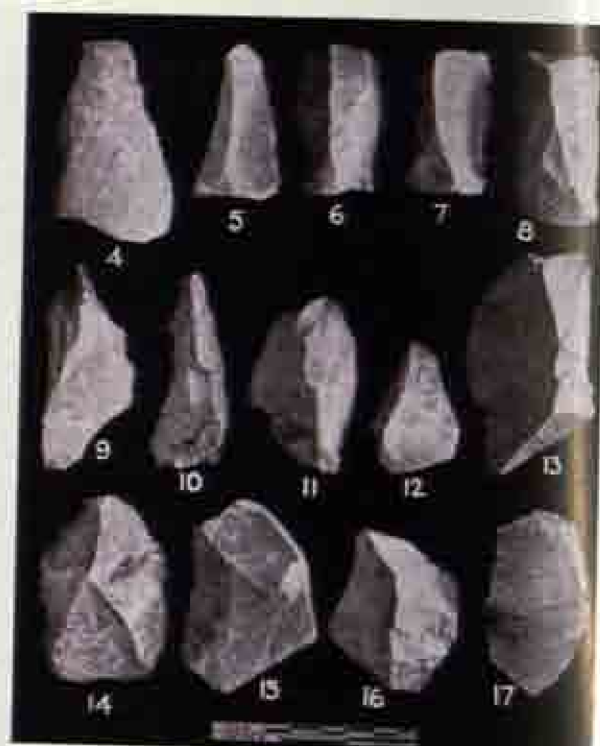
Neoliths from surface. *See p. 155*

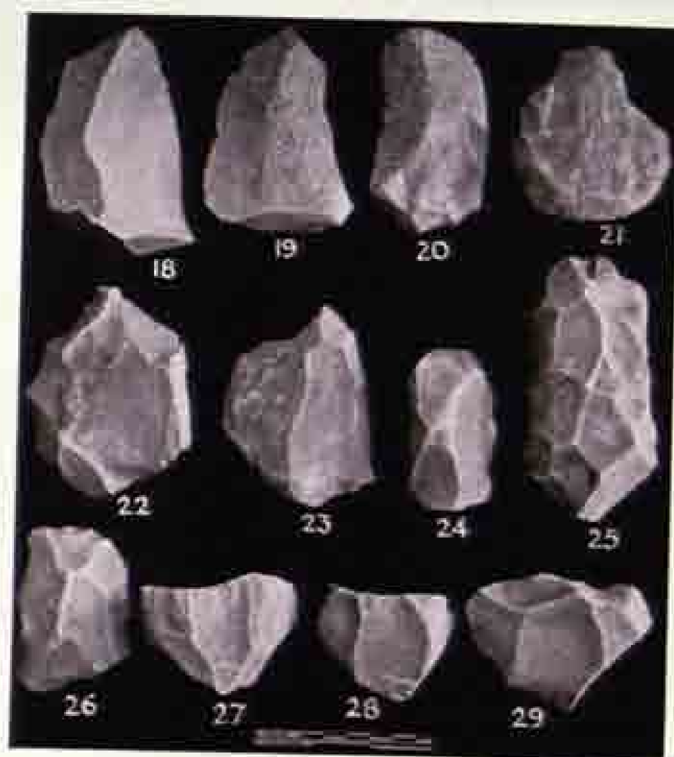


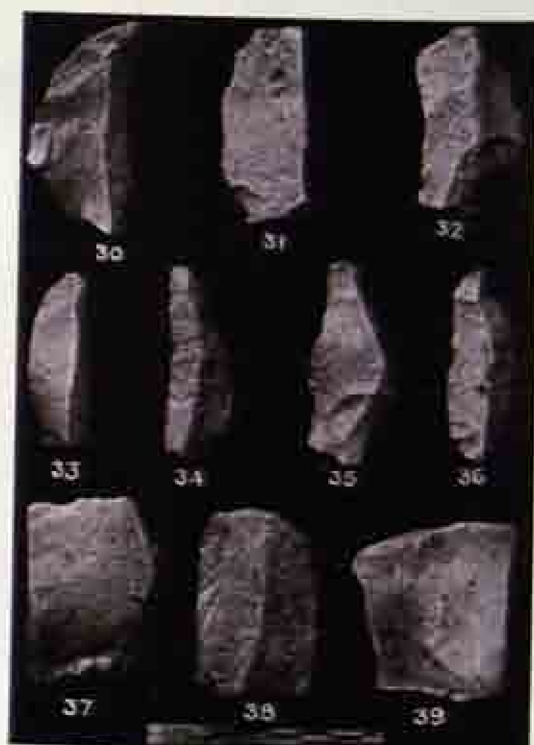


Neoliths from surface. *See p. 155*

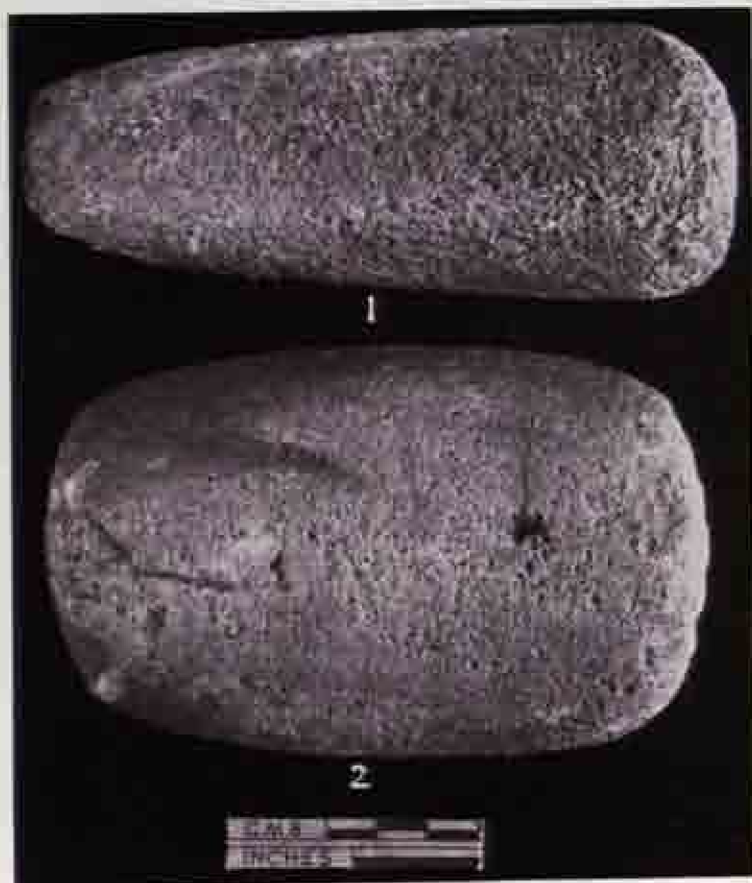


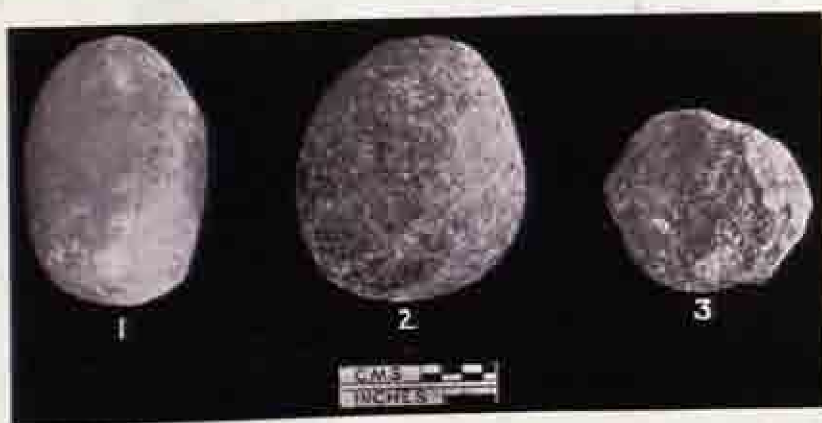




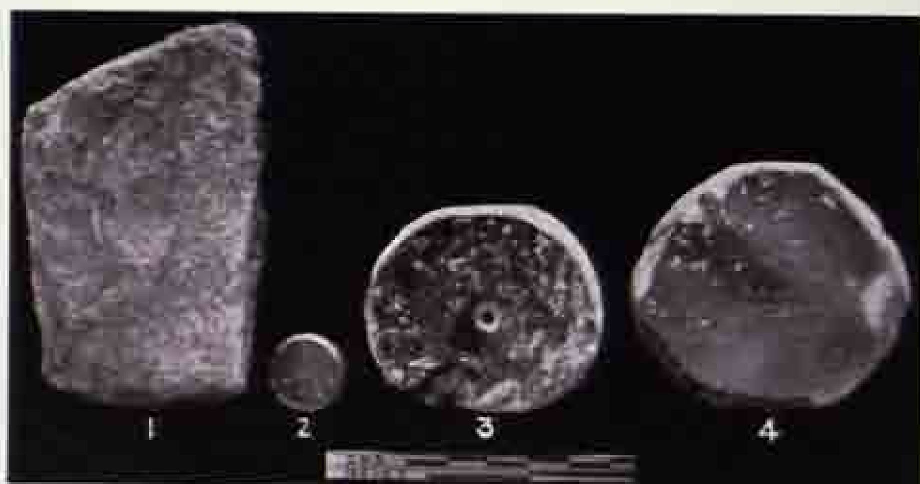


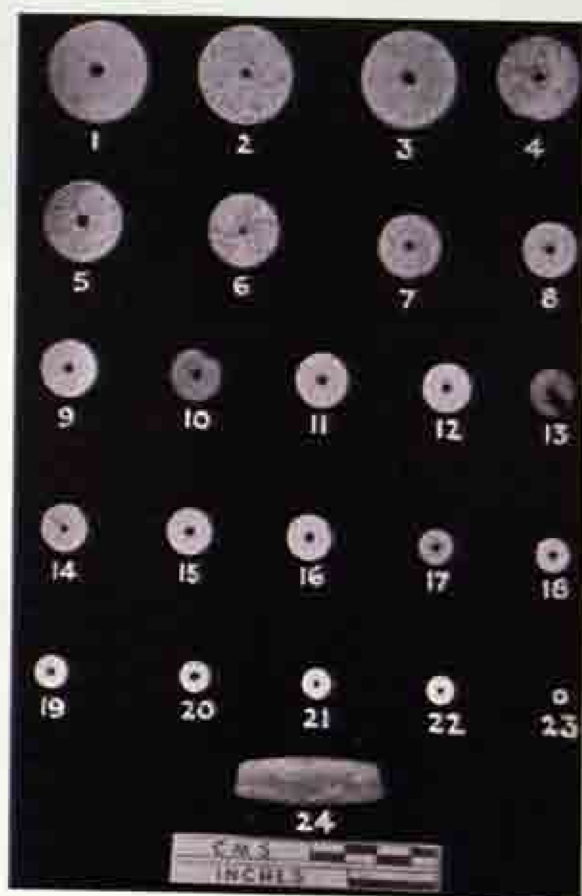
Flakes from neolithic levels. *See pp. 157-159*





Pestles and stone-balls from neolithic levels. See pp. 159 and 160





Casket fragment, pottery discs and beads. *See pp. 161 and 164*

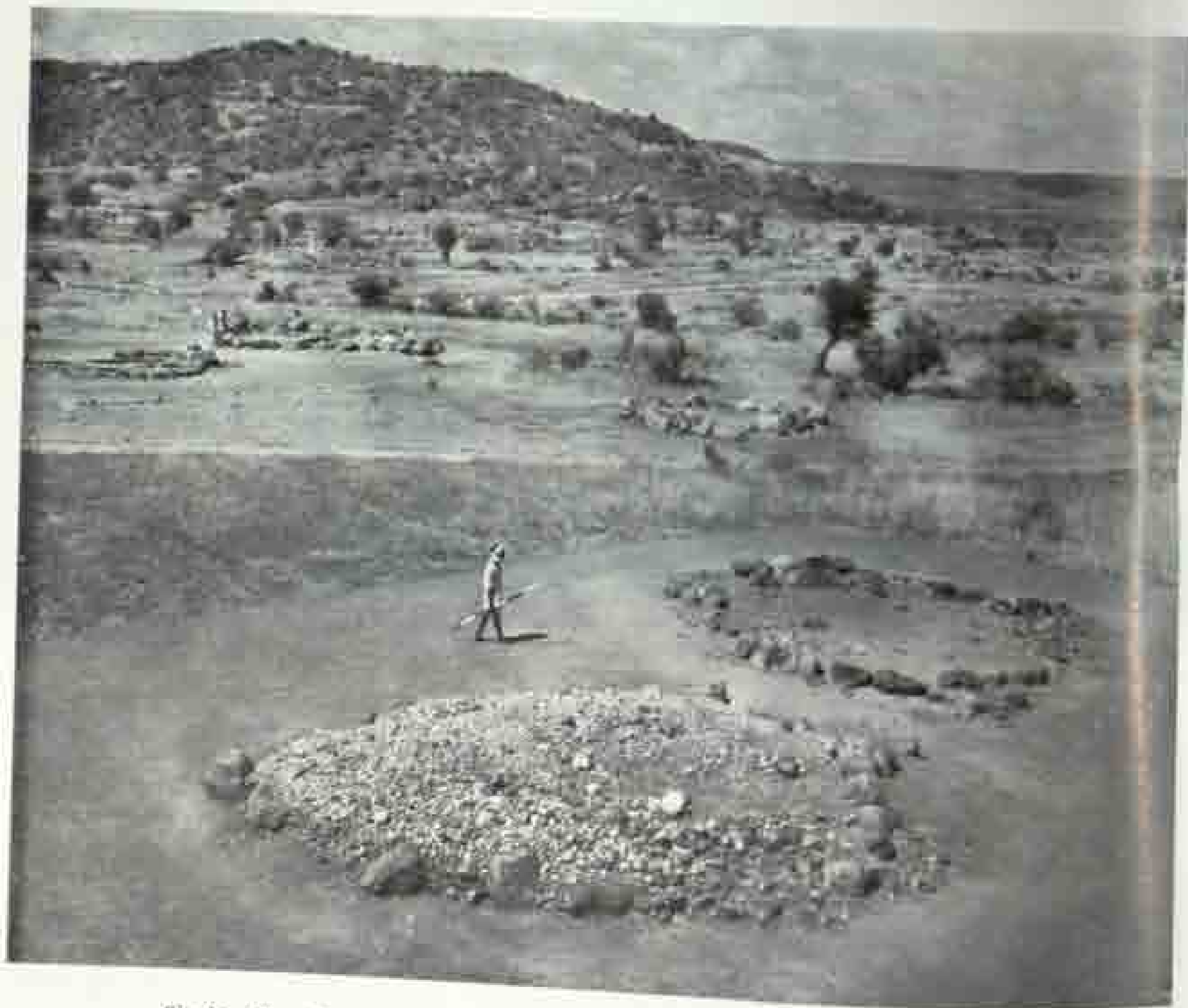


A



B

Site No. 63: A, *Megalithic cluster, before clearance;* B, *General view of megalithic cluster.* *See p. 166*



Site No. 63 : *Close view of megaliths, showing Meg. XIV in the foreground.* See p. 166

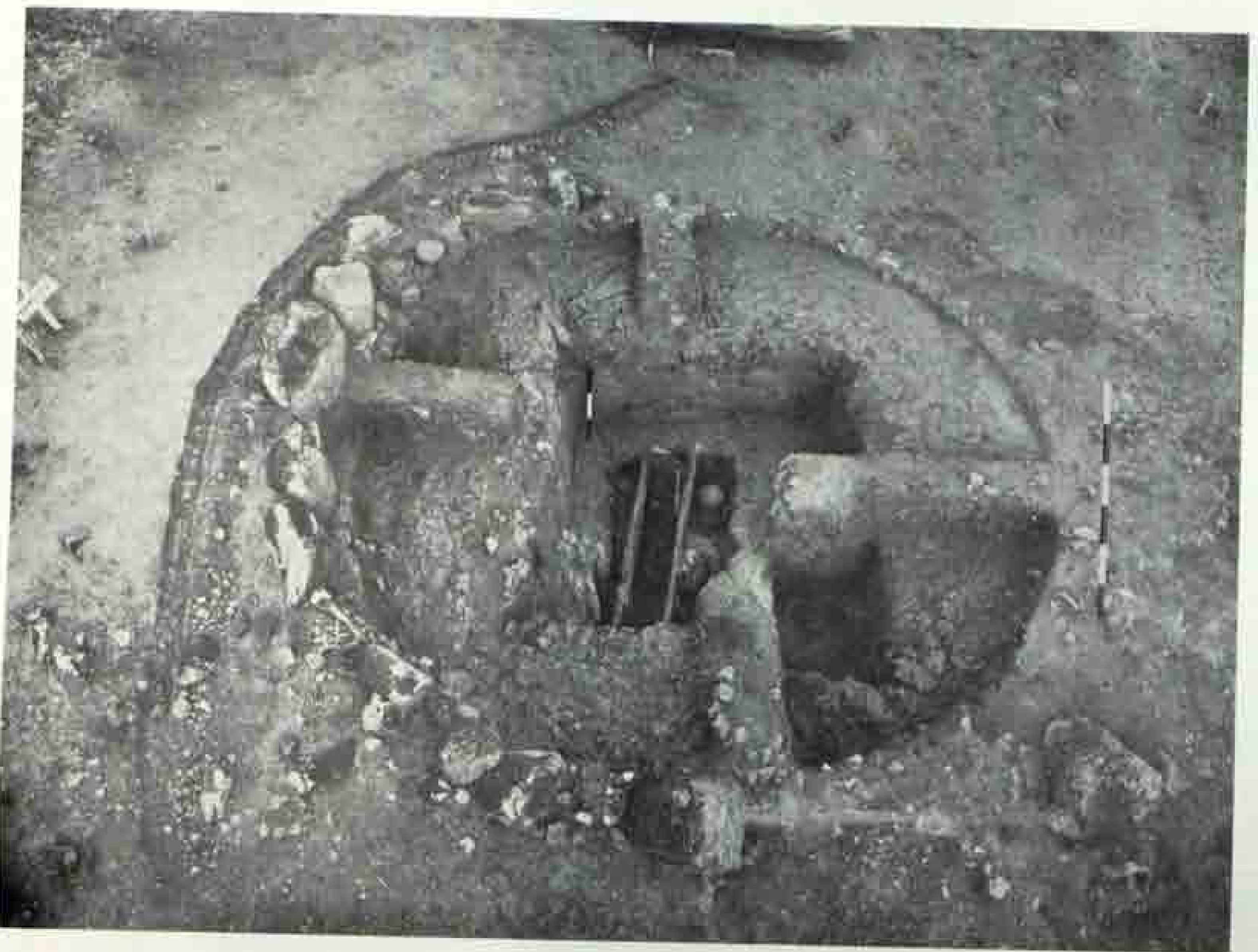


A



B

Site No. 44, Meg. I : A, Section showing the pit with pottery outside the cist; B, Close-up of cist covered with slab fragments and pottery outside. *See p. 166*



Site No. 44, Meg. I : View after baulk removal and clearance. See p. 166



A



B

Site No. 44, Meg. I : A, *Scattered bones within the cist and outside, with pottery*; B, *View after removal of contents of cist.* *See p. 167*



A

B

Site No. 63, Meg. II: A, before clearance; B, after clearance. *See p. 168*



A



B

Site No. 63, Mrg. II: A, before baulk removal, showing pit line in section; B, close-up of pit in section. *See p. 168.*



A



B

Site No. 63: A, Splintered bones with pottery, Meg. II; B, General view of Meg. III, Site No. 76. *See pp. 168 and 169*

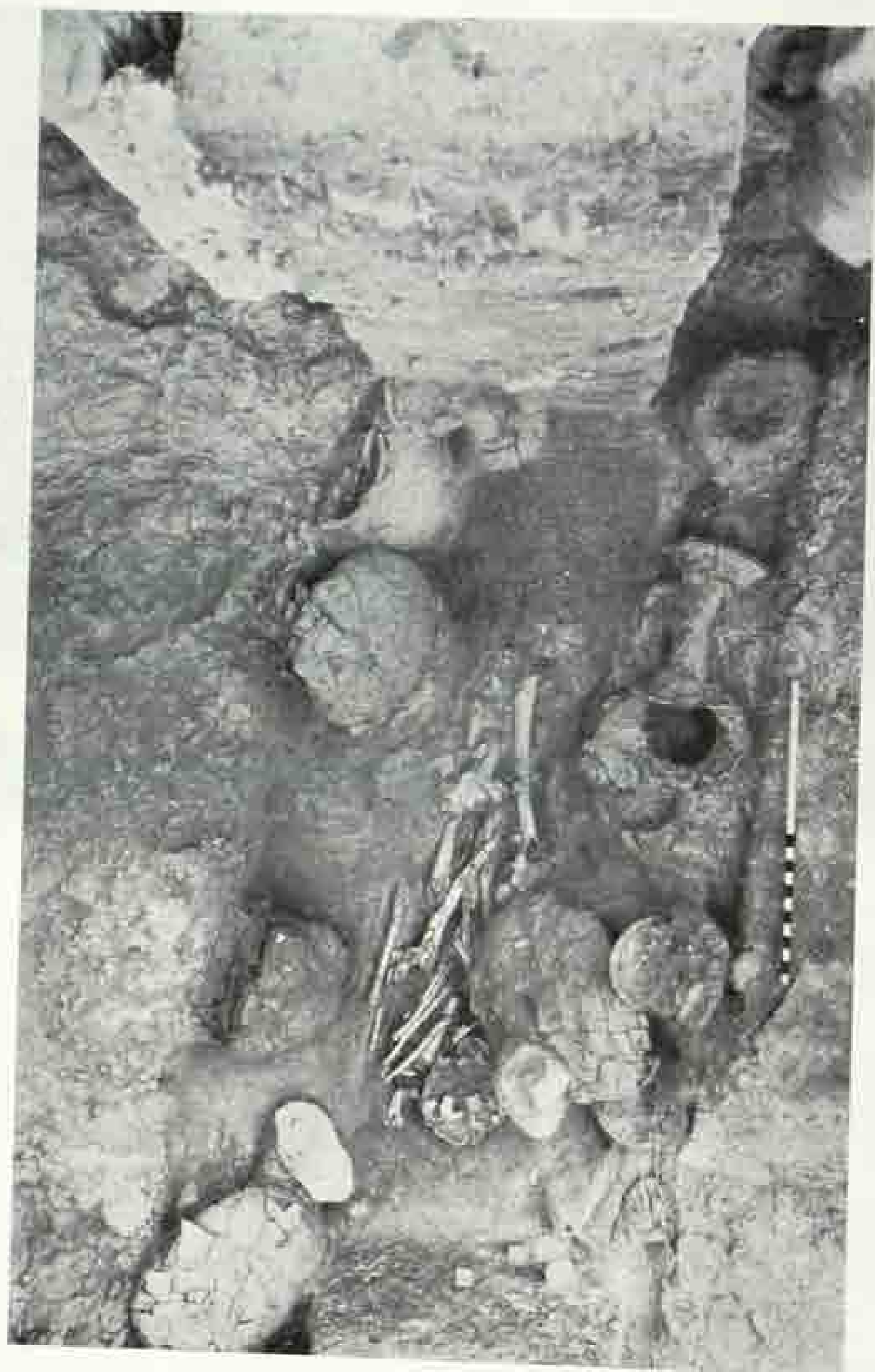


A



B

Site No. 63, Meg. IV : A, During excavation; B, Section showing the pit line. *See p. 169*



Splintered bones with pottery, Meg. V., Site No. 63. *See p. 170*



A

B

Site No. 63, Meg. VI : A, General view before clearance; B, During excavation with Meg. VII in the background. *See p. 170*



A

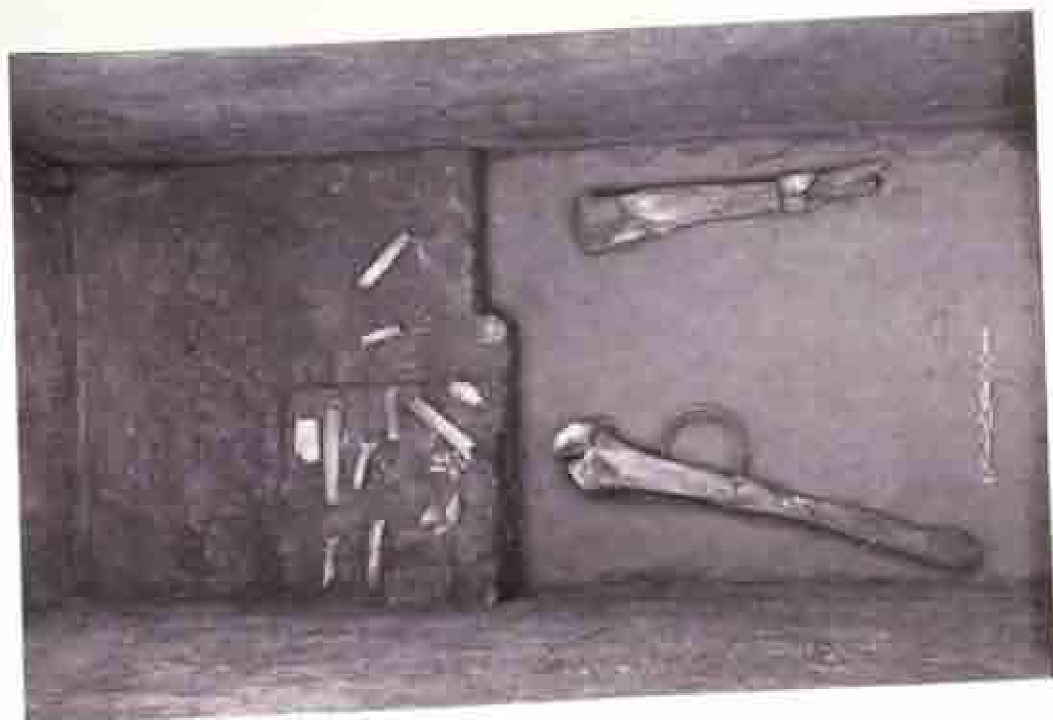


B

Site No. 63, Meg. VII : A, During excavation, showing cap-stones under humus covering. B, Cist with pottery outside. *See p. 172*



A



B

Site No 63, Meg. VII : A, Cist with a row of pots outside and scattered, bones and bronze ring inside the cist, B, Close-up of the bronze ring inside the cist. *See p. 173*



Site No. 63, Meg. VII: Close view of the cist with the fragmentary skulls outside. *See p. 173*



A

B

Site No. 63, Meg. VIII : A, *General view before clearance*, B, *View before excavation.* *See p. 173*



A



B

Site No. 63, Meg VIII : A, Section showing pit line and crumbled pottery at the bottom, B, Close view of the bottom of the pit. *See p. 174*



A



B

Site No. 63, Meg. IX : A, *During excavation,* B, *Graffiti markings on a cap-stone.* *See p. 174*



Site No. 63, Meg. IX: Section showing the pit line. See p. 174



A



B

Site No. 63, Meg. IX : A, *Row of pots in a crumbled condition,* B, *Close-up of pit with splintered bones and crumbled pottery.* *See p. 174*



A



B

Site No. 63, Meg. X : A, *Cap-stones*, B, *During excavation*. *See p. 175*

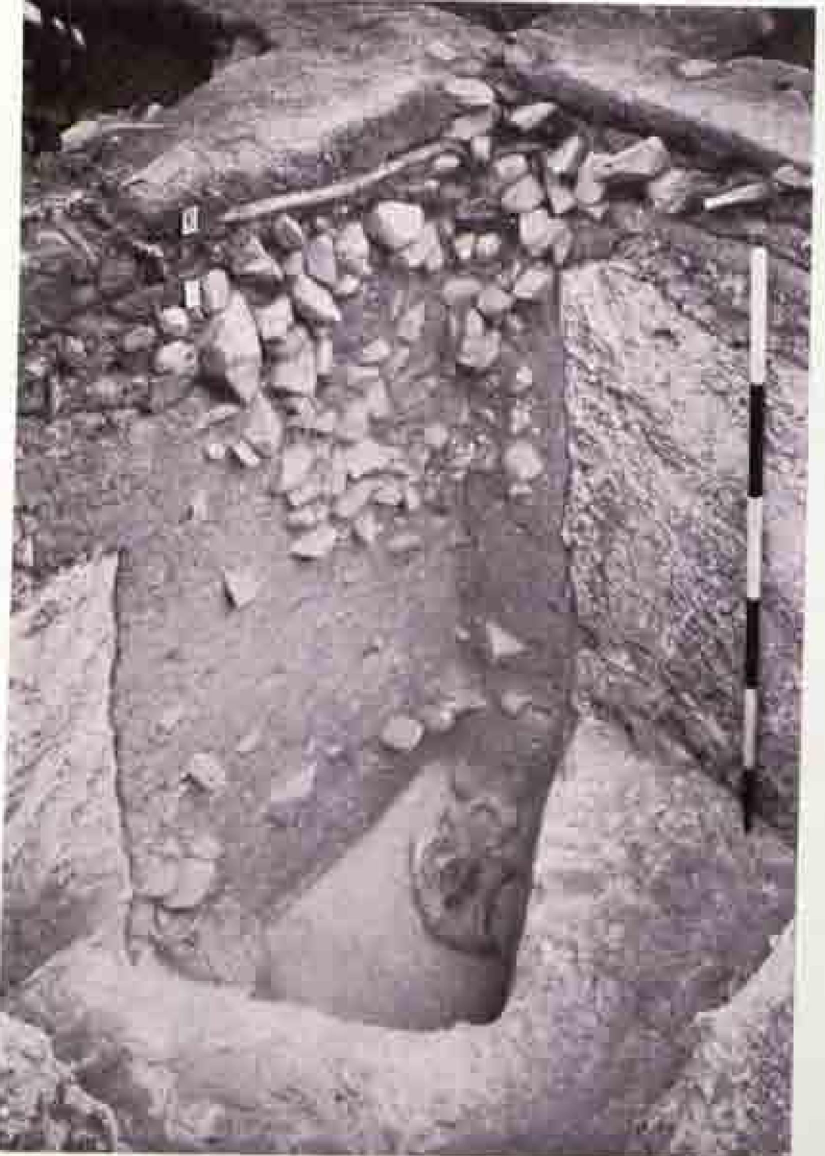


A



B

Site No. 63, Meg. XI : A, *Section showing the pit line and pottery at the bottom*, B, *Splintered bones with a row of crumbled pots*. *See p. 176*



A



B

Site No. 63, Meg. XII : A, *Section showing the pit line and crumbled pottery at the bottom*, B, *Close-up of pit with animal skeleton and crumbled pottery in a lower level.* *See p. 177*



A



B

Site no. 63, Meg. XIII: A, Section showing the pit line with crumbled pottery at the bottom. B, Close-up of ruined bones and pottery. *See pp. 178 and 179*



A



B

Site No. 63. Meg. XIV : A. pit with fragmentary bones and pottery and two long iron implements one lying across the other, B, Pit with ruined pottery and bones. *See p. 178*



A



B

Site No. 63, Meg. XIV : A, *Close-up of iron impliments in the pit*, B, *Close-up of splintered bones.*
See pp. 179 and 180



A

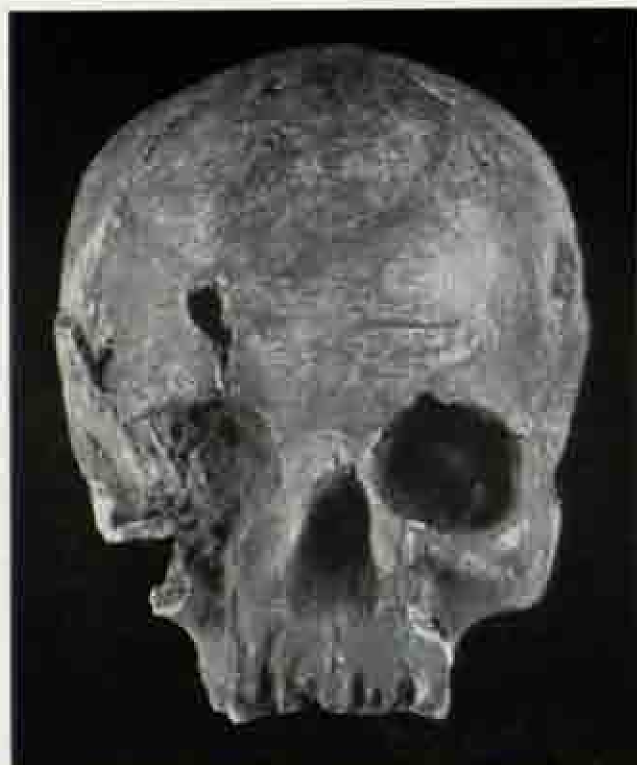


B



C

Site No. 63 : A, Jewellery from Meg. XIV, or Meg. XV, B, General view during excavation, C, Ruined pottery and iron impliments. *See pp. 179 and 181*



A



B



C



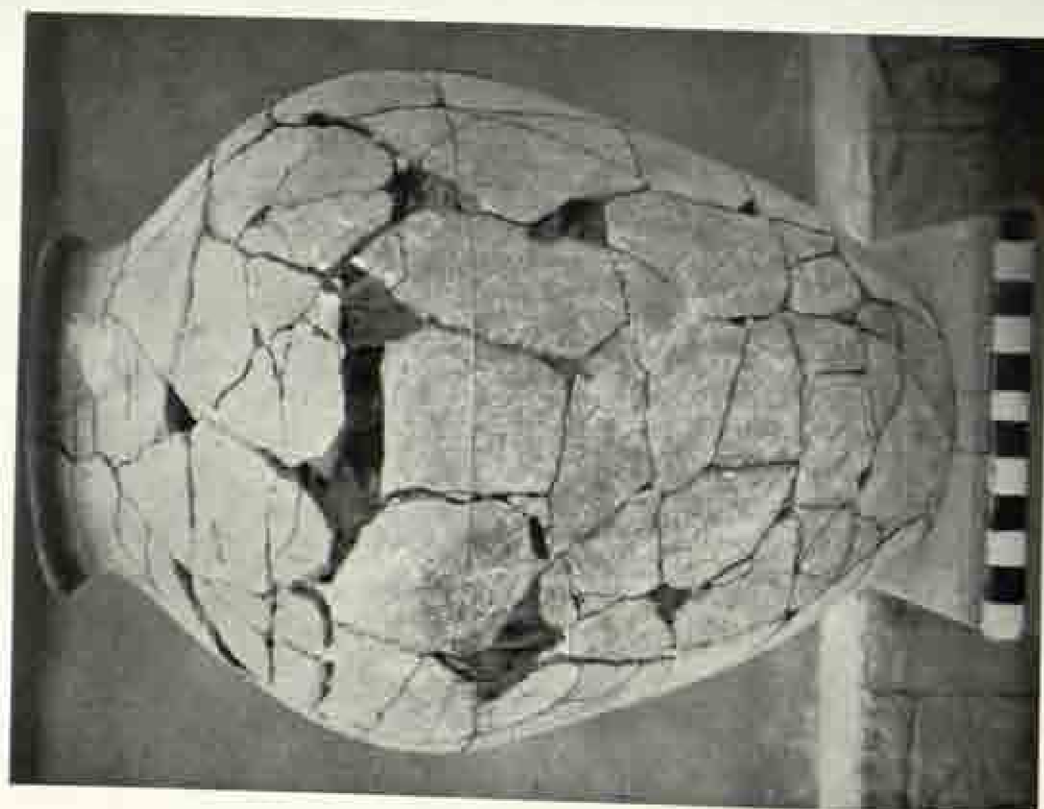
D

Site No 44. Restored skull Meg. I: A, *Front view,* B, *Rear view,* C, *Side view,* D, *Top view.*
See p. 185





B



A

Site No. 63, Meg. X : A, Megalithic Urn type Jar (restored)
B, Mat design in the bottom. *See p. 200*



